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DOS/VS

Systems

System Control Statements

Release 29

IBM

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This is a major revision of, and obsoletes, GC33-5376-0 and Technical Newsletter GN33-8762. It includes changes reflecting support for the System/370 Model 115, new devices (3203, 5203, 3340, 3540, 3780, and 3420 Models 4, 6, and 8), and other DOS/VS system enhancements. The entire chapter "Librarian" has been rewritten for ease of use. Other changes or additions to the text and illustrations are indicated by a vertical line to the left of the change.

This edition, together with Technical Newsletter GN33-8767, applies to Version 5, Release 29, of the IBM Disk Operating System/Virtual Storage, DOS/VS, and to all subsequent versions and releases until otherwise indicated in new editions or Technical Newsletters. Changes are continually made to the information herein; before using this publication in connection with the operation of IBM systems, consult the IBM System/360 and System/370 Bibliography, GA22-6822, for the editions that are applicable and current.

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This manual is provided for those who need to know about the control statements that relate to the SCP (system control programming) of DOS/VS (Disk Operating System/Virtual Storage). The manual consists of the following:

- The sections Initial Program Loader and the Job Control describe these general programs of DOS/VS. These sections are of interest to anyone using the system, including system analysts, programmers, and operators. Detailed attention routine, job control statement, and job control command formats are given.
- The section POWER is of interest to anyone who wants to decrease the execution time of unit record I/O-bound jobs. The section fully describes the operation of the POWER program.
- The sections Linkage Editor and Librarian are of interest to persons responsible for maintaining the resident system. These sections fully describe the control statements for the linkage editor and librarian programs.
- The section System Buffer Load (SYSBUFLD) is of interest to DOS/VS users who have an IBM 3211, 3203, or 5203 Printers attached to their system. The section describes the purpose of SYSBUFLD and how to use it.
- Appendix A contains a summary of job control statements and commands.
- Appendix B contains a summary of the linkage editor.
- Appendix C contains a summary of the POWER statements and commands.

Prerequisite publication:

DOS/VS System Management Guide, GC33-5371

Related publications are listed in the bibliography at the back of this book.

This manual contains descriptions of control statements and commands. These statements and commands are described in detail in the following chapters.

INITIAL PROGRAM LOADER

Before a job can be entered into the system for execution, the supervisor must be read into the supervisor area of real storage and the job control program must be loaded into the virtual background partition. To do this, the operator starts the system by following the initial program load (IPL) procedure.

JOB CONTROL

After the system has been successfully started by means of the IPL procedure, it is ready to accept input for execution. Job control statements are entered via SYSRDR, job control commands via SYSLOG.

Job control runs in any virtual partition. It performs its functions between jobs and job steps. It is not present in the partition while a problem program is being executed.

The term END corresponds to the END key on the IBM 3210 and 3215 Console Printer-Keyboards (SYSLOG for IBM System/370 Models 135 and 145).

The term ENTER corresponds to the ENTER key on DOC (SYSLOG for IBM System/370 Model 115 and Model 125).

END and ENTER are used as message terminators on their respective systems. Thus, the term END/ENTER is used in this publication in reference to SYSLOG for the IBM System/370.

POWER

POWER (Priority Output Writers, Execution Processors and Input Readers) is a program that provides spooling (Simultaneous Peripheral Operations OnLine) services for up to four partitions. It resides in a real partition with a priority higher than that of the partitions it controls. Although POWER runs in real mode, it supports both programs running in real and virtual mode.

LINKAGE EDITOR

Prior to execution in storage, all programs must be placed in a core image library by the linkage editor.

The linkage editor prepares a program for execution by editing the output of a language translator into core image format. The linkage editor also combines separately assembled or compiled program sections or subprograms into phases.

LIBRARIAN

DOS/VS supports four types of libraries:

- Core image library - contains the output from the linkage editor (executable program phases).
- Relocatable library - contains the output of a language translator (object modules) which is used as input to the linkage editor.
- Source statement library - contains books (source language statements, macro definitions, and pre-edited macro definitions) used as input to a language translator.
- Procedure library - stores procedures, that is, sets of system control statements and (optionally) SYSIPT data. The procedures are used to build or complete job streams.

SYSTEM BUFFER LOAD (SYSBUFLD)

SYSBUFLD is a self-relocating special service control processing program for DOS/VS users with IBM 3211, 3203, and 5203 printers. It can be executed as a job or job step to load the Forms Control Buffer (FCB) and the Universal Character Set Buffer (UCB) of the 3211, 3203, and 5203.

CONTROL STATEMENT CONVENTIONS

The conventions used in this publication to illustrate control statements are as follows:

1. Uppercase letters and punctuation marks (except as described in items 3 through 5 below) represent information that must be coded exactly as shown.

2. Lowercase letters and terms represent information that must be supplied by the programmer.

3. Information contained within brackets [] represents an option that can be included or omitted, depending on the requirements of the program. Stacked options contained within brackets, for example

represent alternatives, one and only one of which may be chosen.

4. Options contained within braces {} represent alternatives, one of which must be chosen.

5. An ellipsis (...) indicates that a variable number of items may be included.

6. Underlined elements represent an assumed option in the event a parameter is omitted.

In case of any difference between the conventions given in this manual for control program functions and those appearing in IBM-supplied DOS/VS component publications, observe the specific restrictions of the component.

SPECIAL DEVICES

The following devices that are mentioned are not available in the United States of America:

- IBM 1270 Optical Reader/Scrter
- IBM 1275 Optical Reader/Scrter.

Operation of DOS/VS is initiated through an initial program load (IPL) procedure from the resident disk pack. The first record on track 0 is read into bytes 0-23 of real storage. The information read in consists of an IPL PSW and two CCWs, which in turn read and load the IPL.

The wait state is entered, at which time the user must indicate which supervisor he wants to be loaded.

Operating in the supervisor state, IPL reads the supervisor nucleus into low storage. If a read error is sensed while reading the supervisor nucleus, the wait state is entered and an error code is set in the first word of virtual storage. The IPL procedure must then be restarted.

After successfully reading in the supervisor nucleus, IPL performs these operations:

- Places the CPU in the EC mode.
- Sets the LUB table entry for SYSRES to point to the PUB entry of the channel and unit number of the resident drive.
- Places the processing unit in the wait state with all interruptions enabled.

  (The operator then causes an interrupt, which in turn will cause IPL to read its commands from the card reader, or from the printer-keyboard or DOC -- Display Operator Console.)
- Changes the PUB configuration, if indicated, by ADD or DEL commands or control cards.
- Scans the PUB table to determine whether or not one or more IBM 3211, 3203, and 5203 Printers are attached to the system.

The following describes the IPL commands: ADD, CAT, DEL, DPD, and SET.

ADD Command

To add a device to the PUB table, a command, read by the communication device (SYSLOG or SYSRDR), in the following format is required.

```
ADD X'cuu'[(k)],devicetype [,X'ss'   ]
                           [,X'ssss' ]
                           [,X'ssssss']
```

where:

X'cuu' = channel and unit numbers.

k can be specified as either S or a decimal number from 0 to 255:

S indicates that the device can be switched (that is, physically attached to two adjacent channels). The designated channel is the lower of the two channels.

0 to 255 indicates the priority of a device that cannot be switched, with 0 indicating the highest priority. If k is not given, the assumed priority is 255.

devicetype = actual device (2400T9, 1443, etc.). See type codes in Figure 1.

X'ss'
X'ssss'
X'ssssss' = device specifications (see ASSGN Statement). If absent, the following values are assigned:

X'C0' for 9-track tapes
X'90' for 7-track tapes
X'00' for nontapes
X'00', X'01', X'02', and X'03' are invalid as X'ss' for magnetic tape.

X'ss' specifies SADxxx (Set Address) requirements for IBM 2702 lines:

X'00' for SAD0
X'01' for SAD1
X'02' for SAD2
X'03' for SAD3

This information is not accepted on the ASSGN statements.

X'ss' is required for 1270, 1275, 1412, 1419, and 1419P device types. It specifies the external interrupt bit associated with magnetic ink or optical character readers. The setting X'01' through X'20' correspond to the external interrupt code in low real storage byte 87, bits 7 through 2 respectively. The corresponding external lines to which the control units are attached are as follows:

X'01' PSW bit 31
X'02' PSW bit 30
X'04' PSW bit 29
X'08' PSW bit 28
X'10' PSW bit 27
X'20' PSW bit 26

The X'ss' parameter specifies whether or not the error correction feature is present on an IBM 1018 Paper Tape Punch with 2826 Control Unit Model 1. X'ss' can be:

X'00' no error correction feature
X'01' error correction feature

For the 3705, X'ss' must be specified as one of the following:

X'01' Type 1 channel adapter
X'02' Type 2 channel adapter.

For the 2703 of the Model 115 or 125, X'ss', X'ssss', or X'ssssss' is used to specify the line mode setting for a Start/Stop line or a BSC line.

The bit settings of the line mode specification for each line involved are explained in IBM System/370 Model 115 Functional Characteristics, GA33-1510, and in IBM System/370 Model 125 Functional Characteristics, GA33-1506, respectively. For POWER RJE that uses a 2780 or 2770 terminal, you could, for instance, specify

X'008400' for a non-switched line, or
X'00C400' for a switched line

between the terminal and your Model 115 or 125.

The line mode setting is not accepted on the ASSGN statement. If a one or two byte value is specified, the specified value is right-justified and the rest of the three bytes is filled with zeros.

CAT Command

For VSAM files, the operator can issue the CAT command to assign the VSAM catalog (logical unit SYSCAT) to a disk. The IPL assignment overrides a system generation SYSCAT assignment, if one was made, until the next IPL procedure. CAT may only be issued between the SET and DPD statements. The CAT command is entered from the card reader, the 3210, 3215, or the Display Operator Console. The format is:

```
CAT      UNIT=X'cuu'
```

where cuu is the channel and unit of the disk to be assigned to SYSCAT.

DEL Command

To delete a device from the PUB table, a command, read by the communication device (SYSLOG or SYSRDR), in the following format is required:

```
DEL      X'cuu'
```

where cuu is the channel and unit numbers of the device to be deleted.

DPD Command

The DPD command defines the page data set. The operation code of this command must always be specified during the IPL procedure. All operands are optional; they need be specified only if the required information was not supplied during system generation or if changes in the definition are desired. The DPD command must be the last command entered during the IPL procedure.

```
DPD   [TYPE={N}][,UNIT=X'cuu',CYL=xxx]
           {F}[,VOLID=xxxxxx]
```

The operands of the DPD command may be given in any order.

TYPE TYPE=N indicates that the page data set need not be formatted and the extent limits have not been changed.

If TYPE=N is specified but the page data set does not exist or the extent limits have been changed, TYPE=N is ignored and the page data set is formatted during IPL. In this case, the UNIT and CYL operands must either have been supplied during system generation, or they must be specified in the DPD command.

TYPE=F indicates that the page data set is to be formatted during IPL. Formatting during IPL is required if the page data set is to be extended or if it is to be reallocated.

UNIT UNIT=X'cuu' specifies the channel and unit number (in hexadecimal) of the device that is to contain the page data set. If UNIT is specified, CYL must also be specified.

CYL CYL=xxx specifies the sequential number of the cylinder, relative to zero, where the page data set is to begin (in decimal). (The size of the page data set extent is calculated by the system.) If CYL is specified, UNIT must also be specified.

SYSVIS is the logical unit name of the page data set. It is created at IPL time from information provided by the system generation macro DPD and/or the IPL DPD command. The user specifies the beginning cylinder address and the system calculates the size of the disk extent which is a function of the VSIZE (virtual address area specified by the user) specification and the disk device type, as follows:

VSIZE
----- = number of pages (blocks of
2 2K bytes).

Disk Device Type	Blocks per Cylinder
2314	60
3330	114
3340	36

The allocation requires full cylinders.

The IBM-supplied supervisor does not contain any DPD macro parameters. Therefore, when you IPL, you must enter all operands of the DPD command, including TYPE=F. The IBM-supplied supervisor has a VSIZE of 128K and consequently one cylinder on a 3330 or two cylinders on a 2314 or 3340 are required.

VOLID VOLID=xxxxxx identifies the alphameric volume serial number of the disk pack that contains the page data set. If this operand is omitted both during system generation and in the DPD command, the volume serial number is not checked.

SET Command

Besides the DPD command, the only communication required at IPL time is the SET command. If any ADD or DEL commands are required, they must precede the SET command. The SET command must precede the DPD command. The SET command is entered via the communications device (3210, 3215, Display Operator Console or card reader) and is in the following format:

```
SET     [DATE=value1,CLOCK=value2]
        [,ZONE={EAST}/hh/mm]
               {WEST}
```

value1 - Specifies the year, month, and day of the month in one of the following formats (depending on the installation's standard established during system generation):

mm/dd/yy
dd/mm/yy

value2 - Specifies the local time-of-day in the format hh/mm/ss.

EAST - Specifies that the installation is located at a geographical position east of Greenwich.

WEST - Specifies that the installation is located at a geographical position west of Greenwich.

hh/mm - A decimal value which indicates the difference in hours and minutes between local time and Greenwich Mean Time. hh may be in the range 0-12, mm in the range 0-59.

The parameters that have to be specified with the SET command depend upon the type of system and the type of communications device used. The following groups can be distinguished:

1. If the TOD clock is in the set state, the command may be given in one of the four possible forms:

```
SET
SET ZONE=
SET DATE=   ,CLOCK=
SET DATE=   ,CLOCK=   ,ZONE=
```

2. If the TOD clock is in the not-set state, the command must be given in either of two forms:

```
SET DATE=   ,CLOCK=
SET DATE=   ,CLOCK=   ,ZONE=
```

3. If the TOD clock is inoperative, the command must be given in the form:

```
SET DATE=   ,CLOCK=
```

Notes:

1. 3210/3215/DOC.

   If the TOD clock is in the set state, message OI30I is printed. If the TOD clock is in the not-set state, message OI31A is printed. If the TOD clock is inoperative, messages OI32I and OI31A are printed.

2. Card Reader.

   No messages are given.

3. CLOCK parameter.

   When using the CLOCK parameter of the SET command, the time-of-day security switch must be depressed to the ENABLE SET position.

4. Use of parameters.

   Although, when the TOD clock is in the set state, no parameters need to be specified with the SET command, it is strongly recommended to do so, for reasons of error recovery.

5. The date and time-of-day supplied in the SET command for systems that have TOD clock support should be realistic values, that is, the difference between local time and GMT may nct be more than twelve hours, hh may not be more than 12, and mm may not be more than 59. The time-of-day clock should always contain the exact time (that is the time that has elapsed since January 1, 1900, 00.00 a.m.).

DEVICES

Figure 1 lists the device types available with DOS/VS. This figure shows the device type codes to be used in ADD commands when adding devices to the system.

Device Type Codes	Actual IBM Device	Device Type
2400T9	9-track Magnetic Tape Units (2400-series)	Magnetic Tape Devices
2400T7	7-track Magnetic Tape Units (2400-series)	
3410T9	9-track Magnetic Tape Units (3400-series)	
3410T7	9-track Magnetic Tape Units (3400-series)	
3420T9	9-track Magnetic Tape Units (3400-series)	
3420T7	7-track Magnetic Tape Units (3400-series)	
2495TC	2495 Tape Cartridge Reader	Tape Cartridge Reader
1442N1	1442N1 Card Read Punch	Card Read Punches
2520B1	2520B1 Card Read Punch	
2596	2596 Card Read Punch	
3525RP	3525 Card Read Punch (with optional read feature)	
2560	2560 Multifunction Card Machine	
5425	5425 Multifunction Card Unit	
2501	2501 Card Reader	Card Readers
2540R	2540 Card Reader	
3504	3504 Card Reader	
3505	3505 Card Reader	
2540P	2540Card Punch	Card Punches
2520B2	2520B2 Card Punch	
1442N2	1442N2 Card Punch	
2520B3	2520B3 Card Punch	
3525P	3525 Card Punch	
1403	1403 Printer	Printers
1403U	1403 Printer with UCS feature	
1443	1443 Printer	
3211	3211 Printer	
5203	5203 Printer	
5203U	5203 Printer with UCS feature	
3203	3203 Printer	
3525P	3525 Card Punch (with optional print feature)	
1050A	3210, 3215 Console Printer-Keyboards	Printer-Keyboards
125D	Model 125 Integrated Display Operator Console	Display Units
125DP	Model 125 Integrated Display Operator Console with optional Console Printer	
UNSP	Unsupported Device	No burst mode on multiplexer channel
UNSPB	Unsupported Device	Burst mode on multiplexer channel
2311	2311 Disk Drive	DASD
2314	2314 Direct Access Storage Facility	
2314	2319 Disk Storage Facility	
3330	3330-1, 3330-2, or 3333-1 Disk Storage	
3340R	3340 Disk Storage with Disconnect Command Chaining (DCC) feature (with or without 3340 Data Module, Model 35 or 70)	
3340	3340 Disk Storage without DCC feature (with or without 3340 Data Module, Model 35 or 70)	
2321	2321 Data Cell Drive	

Figure 1. Device Type Codes (Part 1 of 2)

Device Type Codes	Actual IBM Device	Device Type
3540	3540 Diskette Input/Output Unit	Diskette Input/Output Units
1419	1255 Magnetic Character Reader	MICR-Magnetic Ink Character Recognition Devices
1419	1259 Magnetic Character Reader	
1419	1419 Magnetic Character Reader	
1419P	1419 Dual Address Adapter Primary Control Unit	
1419S	1419 Dual Address Adapter Secondary Control Unit	
2701	2701 Line Adapter Unit	Teleprocessing Lines
2702	2702 Transmission Control Unit	
2703	2703 Transmission Control Unit	
2955	2953 Data Adapter Unit	Data Link for RETAIN
1017	1017 Paper Tape Reader with 2826 Control Unit Model 1	Paper Tape Readers
1017TP	1017 Paper Tape Reader with 2826 Control Unit Model 2	
2671	2671 Paper Tape Reader	
1018	1018 Paper Tape Punch with 2826 Control Unit Model 1	Paper Tape Punches
1018TP	1018 Paper Tape Punch with 2826 Control Unit Model 2	
1419	1270 Optical Reader Sorter	Optical Readers
1419P	1275 Optical Reader Sorter	
1287	1287 Optical Reader	
1288	1288 Optical Page Reader	
3881	3881 Optical Mark Reader	
3886	3886 Optical Character Reader	
2260	2260 Display Station or 1053 Printer	Display Station
3270	3270 Information Display System	
3705	3705 Communications Controller	
3277	3277 Display Station or Printer	
3277B	3277 Display Station or Printer running in burst mode on the MPX channel	
7770	7770 Audio Response Unit	Audio Response Units

Figure 1. Device Type Codes (Part 2 of 2)

This chapter contains descriptions, formats, and usages of the job control commands and statements, and attention routine commands, which are identified as follows:

job control statement - JCS

job control command - JCC

attention routines - AR

Figure 2 contains the commands and statements grouped by function, and also indicates the programs or routines for which they are valid. An alphabetical overview of all statements and commands is given in Appendix A.

FORMATTING STATEMENTS AND COMMANDS

JOB CONTROL STATEMENTS

Job control statements conform to the general rules for formatting DOS/VS control statements.

- Name. Two slashes (//) identify the statement as a control statement. They must be in columns 1 and 2. At least one blank must immediately follow the second slash. Exception: The end-of-job statement contains /& in columns 1 and 2, the end-of-data-file statement contains /* in columns 1 and 2, the end-of-procedure statement contains /+ in columns 1 and 2, and the comment statement contains * in column 1 and blank in column 2.

- Operation. Describes the operation to be performed. It can be up to eight characters long. At least one blank follows its last character.

- Operand. May be blank or may contain one or more entries separated by commas. The last term must be followed by a blank, unless its last character is in column 71. Any blank within the operand fields, except for fields contained within apostrophes, is considered an end-of-operand indication. No further processing of that card occurs.

Type of Command or Statement	Operation	Valid for JCS	AR	JCC
Job Identification	JOB	X		
	/&	X		
	/+	X		
File Definition	DLAB	X		
	DLBL	X		
	EXTENT	X		
	TLBL	X		
	TPLAB	X		
	VOL	X		
	XTENT	X		
	/*	X		
Pass Information to Operator	*	X		
Pass Information to Program	DATE	X		
	LBLTYP	X		
	OPTION	X		
	OVEND	X		X
	UPSI	X		
Job Stream Control	BATCH		X	
	CANCEL		X	X
	PAUSE	X	X	X
	PRTY		X	
	START		X	
	STOP			X
	UNBATCH			N1
Setting System Parameters	ALLOC		X	X
	ALLOCR		X	X
	SET			X
Operator Communications	ALTER		X	
	DSPLY		X	
	DUMP		X	
	END or ENTER key		X	X
	ENDSD		X	
	IGNORE		X	X
	LOG		X	X
	MSG		X	
	MODE		X	
	NEWVOL		X	
	NOLOG		X	X
	ZONE	X		

N1 Valid only in a foreground partition.

Figure 2. JCS, JCC, and AR by Function (Part 1 of 2)

Type of Command or Statement	Operation	Valid for JCS	AR	JCC
Control of I/O System	ASSGN	X		X
	CLOSE	X		X
	DVCDN			X
	DVCUP			X
	HOLD			X
	LISTIO	X		X
	MAP		X	X
	MTC	X		X
	RESET	X		X
	ROD			X
	UCS			X
Execution of Program	EXEC	X		X
	RSTRT	X		

Figure 2. JCS, JCC, and AR by Function (Part 2 of 2)

JOB CONTROL AND ATTENTION COMMANDS

Job control commands and attention commands contain the operation code, at least one blank and then the specified parameters. The parameters are separated by commas. The operation code usually begins in column 1 of the command, but this is not required.

- In contrast to job control statements (JCS), which are normally entered by the programmer, commands (job control and attention) are normally entered by the operator.
- Job control commands (JCC) are issued between jobs or job steps and are entered through SYSRDR or SYSLOG. (Job control statements, on the other hand, are usually coded as part of the input stream and are entered through SYSRDR.)
- Attention commands (AR) can be issued at any time by pressing the request key on SYSLOG. Some of these commands can be issued only in a multiprogramming environment.

JOB CONTROL STATEMENTS SUMMARY

All job control statements are essentially free form. Information starts in column 1 and cannot extend past column 71. Continuation cards are not recognized by job control. For the exception to this rule, see the descriptions of the DLAB, DLBL, and TPLAB statements.

Job control normally reads from the device identified by the symbolic name SYSRDR. However, job control statements can also be entered through SYSLOG, or they may be retrieved from the procedure library, where they were previously cataloged. A brief description of the job control statements follows.

ASSGN	Used at execution time to assign a specific device address to the symbolic unit name used.
CLOSE	Closes either a system or a programmer logical unit assigned to tape, disk, or diskette.
DATE	Contains a date that is put in the communications region.
DLBL[1]	Contains file label information for DASD or diskette label checking and creation.
EXEC	Indicates the end of job control statements for a job step and that a cataloged procedure is to be retrieved before a job step is executed.
EXTENT[1]	Defines each area, or extent, of a DASD file or diskette volume.
JOB	Indicates the beginning of control information for a job.
LBLTYP	Defines the amount of storage to be reserved at link-edit time for processing tape and nonsequential DASD file labels in the partition.
LISTIO	Used to get a listing of I/O assignments. Ignored by job control if SYSLST is not assigned.
MTC	Controls operations on logical units to IBM 2400/3400 series magnetic tapes.
OPTION	Specifies one or more of the job control options.
OVEND	Indicates that no more overwrite statements will follow for the respective procedure.
PAUSE	Causes a pause immediately after processing this statement.
RESET	Resets I/O assignments to the standard assignments.
RSTRT	Restarts a checkpointed program.
TLBL[1]	Contains file label information for tape label checking and writing.
UPSI	(User Program Switch Indicators) Allows the user to set program switches that can be tested.
ZONE	Initializes the zone field in the communications region.
/*	Indicates the end of a data file or the end of a job step.
/&	Indicates the end of a job.
*	Job control comments.
/+	Indicates the end of a procedure.

Programming support continues for the following job control statements provided in previous versions of the system.	
DLAB[1]	Contains file label information for DASD label checking and creation.
TPLAB[1]	Contains file label information for tape label checking and writing.
VOL[1]	Used when a set of label information for magnetic tape file or a DASD file is specified. It is not required with the current DLBL, EXTENT, or TLBL statements.
XTENT[1]	Defines each area, or extent, of a DASD file. It is used in conjunction with the VOL and DLAB statements.
[1] The combination of DLAB, VOL, and XTENT statements should not be used to supply the extent and label information for the IBM 3330, 3333, and 3340. To supply this information, use the DLBL and EXTENT statements. The combination of VOL and TPLAB statements contains file label information for tape label checking and writing. These two statements can be replaced by the TLBL statement.	

Any job control statement other than these is recognized as an error. A message is issued so that the programmer or operator can correct the statement in error. Some of the errors recognized are:

- Invalid symbolic unit name.
- No space reserved in LUB table for a symbolic unit.
- Invalid device type.
- Invalid length of field.
- Invalid character.
- Missing /& statement.
- A volume (VOL) statement does not precede a label (DLAB or TPLAB) statement.
- An EXTENT statement does not immediately follow its associated DASD label (DLBL) statement.

Whenever an invalid statement is indicated, the statement must be reissued to be effective. For example, if an OPTION LINK is encountered without a SYSLNK assignment, the OPTION statement must be reentered after assigning SYSLNK.

SEQUENCE OF JCS AND JCC

The job control statements for a specific job always begin with a JOB statement and end with a /& (end-of-job) statement. A specific job consists of one or more job steps. Each job step is initiated by an EXEC statement. Preceding the EXEC statement are any job control statements necessary to prepare for the execution of the specific job step. The only limitation on the sequence of statements preceding the EXEC statement is that DLBL statements must immediately precede the corresponding EXTENT statements. If the DLBL and EXTENT statements for a private core image library are in the input stream (if the information is not contained on the label cylinder), they must precede the ASSGN SYSCLB statement.

The LBLTYP statement is used at link-edit time and must precede the // EXEC LNKEDT statement; for self-relocating programs, however, it is submitted immediately preceding the // EXEC statement for the program.

INDIVIDUAL FORMATS (JCS, JCC, AR)

Detailed descriptions of the formats and functions of individual JCS, JCC, and AR statements and commands follow in alphabetic sequence. If the JCC and AR formats coincide, this is indicated by a combined heading, JCC and AR Format.

JOB CONTROL STATEMENTS AND COMMANDS

ALLOC

The ALLOC command (Allocate Virtual Address Area) permits the operator to allocate address space in the virtual address area (not already allocated to the shared virtual area) to foreground partitions. The number of bytes to be allocated for a foreground partition is specified in 2K (2048 bytes) increments.

Note: ALLOC cannot be specified for a single-partition system.

JCC and AR Format

```
ALLOC F1=nK[,F2=nK][,F3=nK][,F4=nK]
```

The order of operands is arbitrary. At least one operand must be specified. The

specified number is equal to the number of foreground partitions.

The value n should be an even integer. n must not be smaller than 64 for an active foreground partition. Any specification smaller than 64 is flagged and must be corrected; any uneven specification greater than 64 is rounded up to the nearest even integer.

Note also that the size of the shared virtual area (SVA) must be taken into account. (Refer to the SET command for more details.) If VSAM is to be executed from the SVA, a GETVIS area of approximately 30K is required in the partition. If VSAM is to be executed in the partition, a GETVIS area of approximately 200K is required in that partition.

The following considerations apply to storage allocation among foreground and background programs that run in virtual mode:

1. Allocation of virtual partitions starts at the address immediately preceding the SVA, which is at the high end of the virtual address area. The areas are always contiguous, with no gaps between the allocated partitions. If the size of one or more partitions is changed, the boundaries of the remaining partition(s) are moved accordingly.

2. The size of the virtual background partition is not allocated or changed explicitly, but is changed implicitly by allocating or changing the size of one or more virtual foreground partitions. Storage neither allocated to the virtual foreground partitions nor to the shared virtual area automatically belongs to the virtual background. The virtual background must always have at least 64K bytes. The partition can be stopped by the STOP command, but not unbatched by the UNBATCH command.

3. The size of the virtual foreground partitions must always be allocated or changed explicitly. The size of an unspecified virtual foreground partition is not changed. When changing the size of one or more virtual foreground partitions, the starting and/or end addresses of the remaining partition(s) change accordingly. The ALLOC command must therefore be used with care with regard to programs which are linked to specific load addresses and which cannot be relocated.

4. To delete a virtual foreground partition from the system, you must issue an ALLOC command specifying a size of 0K for the respective partition. Only an inactive partition can be deleted. A foreground partition is inactive if it has been unbatched (by the UNBATCH Command) or if it has never been activated (by the BATCH or START command).

5. The maximum permissible size of the virtual background partition is the size of the virtual address area minus the size of the SVA specified for the system. The maximum size allowed for a virtual foreground partition is the size of the virtual address area minus 64K for the virtual background and minus 64K for the SVA.

6. No allocation takes place when the ALLOC command would move the start address of a virtual partition upwards and/or the end address downwards while a program is running in that partition.

   Exception: The end address of the partition in which job control is processing an ALLOC command may be moved downwards so that a partition of 64K remains.

If the rules listed are violated, corresponding error messages (1P0nD or 1S0nD) are issued, indicating that the ALLOC command was rejected and that a correct command has to be entered.

ALLOCR

The ALLOCR command (Allocate Real Storage) permits the operator to allocate the real address area among foreground and background programs, that is, to allocate real partitions. The number of bytes to be allocated is specified in 2K increments.

Note: ALLOCR cannot be specified for a single-partition system.

JCC and AR Format

```
ALLOCR BGR=nK[,F1R=nK][,F2R=nK]
       [,F3R=nK][,F4R=nK]
```

The order of operands is arbitrary; at least one operand must be specified. The maximum number of operands is equal to the number of partitions specified during system generation in the NPARTS parameter of the SUPVR macro.

n must be an even integer. It may also be zero.

The following considerations apply to storage allocation in the real address area:

1. Allocation starts at the end of the supervisor. The areas are always contiguous, with no gaps between the allocated partitions. The main page pool is at the high end of the real address area. If the size of one or more real partitions is changed, the boundaries of the remaining partition(s) are moved accordingly. For this reason the ALLOCR command must be handled with care with regard to programs that are linked to specific load addresses in real storage and which cannot be relocated.

   Note: The maximum size of the real address area which can be allocated by the ALLOCR command is the area specified by the RSIZE parameter of the VSTAB macro at system generation (minus the size of the supervisor) or the real storage available in the hardware system being used, (minus the size of the supervisor), whichever is smaller.

2. The size of the page pool is not allocated or changed explicitly but is changed implicitly by allocating or changing the size of one or more real partitions. Storage not allocated to real partitions and not occupied by the supervisor belongs automatically to the main page pool.

   The minimum size of the main page pool is:

   - 18K minus the size of the smallest real partition if the smallest real partition is 18K or less and PFIX=NO (plus 2K if AP=YES). If the SDL (system directory list) is active, however, the main page pool must be at least 4K.
   - 18K if PFIX=YES (plus 2K if AP=YES).
   - 18K if phases from the SVA are to be executed.

3. The size of each real partition must always be allocated or changed explicitly (including that of the real background partition). The size of an unspecified real partition is not changed.

   The size of each real partition may be changed arbitrarily; it may even be reduced to zero. Depending on the changes made, however, the boundaries of adjacent partitions change.

   The size of an active real partition can be reduced only via the ALLOCR job control command. When a real partition is inactive, either the ALLOCR job control command or the ALLOCR attention command may be used.

   The background partition is always active. A foreground partition is inactive if it has been unbatched (by the UNBATCH command) or if it has never been batched (by the BATCH or START command). Otherwise it is active. When a partition is increased, either the size of another partition or the main page pool is decreased. A partition can be decreased only if it is inactive.

4. A program running in a virtual partition may fix pages (via the PFIX assembler macro) only if the attached real partition in a multi-partition system has a size greater than zero. It may fix as many pages as the real partition contains page frames.

   In a single-partition system, a program running in virtual mode may fix all pages with the exception of the 18K required for the minimum main page pool.

5. Real storage is not allocated when an ALLOCR command would move the start address of a real partition upwards and/or the end address downwards while a program is running in that partition, or when the real partition belongs to a virtual partition in which a program running in virtual mode may fix pages.

   Exception: The size of a real partition in whose attached virtual partition job control is processing an ALLOCR command may be changed arbitrarily; it may even be reduced to zero.

If the rules listed are violated, corresponding error messages (1P0nD or 1S0nD) are issued, indicating that the ALLOCR command was rejected and that a correct command has to be entered.

ALTER

The ALTER command allows the operator to alter 1 to 16 bytes of virtual storage, starting at the specified hexadecimal address. After the command has been entered and the END/ENTER key pressed, the hexadecimal representation of the

information to be placed in storage should be entered on the device assigned to SYSLOG. Two hexadecimal characters (0 through F) must be entered for each byte to be changed. If an odd number of characters is entered, the last character is ignored and its associated byte is unaltered.

AR Format

ALTER address

address The six-digit hexadecimal address, with leading zeros if necessary, to start storage alteration.

If the specified address is within the supervisor area or the shared virtual area (SVA), a message is issued and the operator has the option to cancel or to change the address.

If the specified address is within an invalid address range, the command is ignored and a corresponding informatory message issued.

If the 16 bytes to be altered cross the boundary from a valid to an invalid address space, only the bytes of the valid address space are altered and a corresponding informatory message is issued.

ASSGN

The ASSGN command or statement (Assign Logical Name) assigns a logical I/O unit to a physical device. Only DASD can be assigned to (shared by) more than one partition concurrently.

The general format for the ASSGN statement/command is as follows:

Name	Operation	Operand 1	Operand 2	Other Operands (Optional)
//	ASSGN	SYSxxx,	X'cuu'	,TEMP
			(address-list)	,PERM
(blank			UA	,VOL=volserno
for			IGN	,SHR
JCC)			SYSyyy	,X'ss'
			device-class	,ALT
			device-type	,H1
				,H2

The operands of the ASSGN card can be combined in various ways. The format is therefore broken down into groups:

- For any device
- For disks
- For diskettes
- For tapes
- For printers
- For card (read) punches
- For card readers.

The operands are processed in the sequence given for each combination.

For any device

```
[//] ASSGN SYSxxx,{X'cuu'        }[,TEMP]
                  {(address-list)}[,PERM]
                  {SYSyyy       }
                  {UA           }
                  {IGN          }
```

For disks

```
[//] ASSGN SYSxxx,{X'cuu'          }[,TEMP] [,VOL=volserno] [,SHR]
                  {(address-list)  }[,PERM]
                  {SYSyyy          }
                  {DISK            }
                  {2311            }
                  {2314            }
                  {3330            }
                  {3340            }
```

For diskettes

```
[//] ASSGN SYSxxx,{X'cuu'          }[,TEMP]
                  {(address-list)  }[,PERM]
                  {SYSyyy          }
                  {DISKETTE        }
                  {3540            }
```

For tapes

```
[//] ASSGN SYSxxx,{X'cuu'          }[,X'ss'] [,TEMP][,VOL=volserno]
                  {(address-list)  }[,ALT  ] [,PERM]
                  {SYSyyy          }
                  {TAPE            }
                  {2400T7          }
                  {2400T9          }
                  {3410T7          }
                  {3410T9          }
                  {3420T7          }
                  {3420T9          }
```

For printers

```
[//] ASSGN SYSxxx,{X'cuu'          }[,TEMP]
                  {(address-list)  }[,PERM]
                  {SYSyyy          }
                  {PRINTER         }
                  {1403            }
                  {1403U           }
                  {1443            }
                  {3203            }
                  {3211            }
                  {5203            }
                  {5203U           }
```

For card (read) punches

```
[//] ASSGN SYSxxx,{X'cuu'          }[,TEMP]
                  {(address-list)  }[,PERM]
                  {SYSyyy          }
                  {PUNCH           }
                  {1442N1          }
                  {1442N2          }
                  {2520B1          }
                  {2520B2          }
                  {2520B3          }
                  {2540P           }
                  {2560[,H1][,H2]  }
                  {2596            }
                  {3525P           }
                  {3525RP          }
                  {5425[,H1][,H2]  }
```

For card readers

```
[//] ASSGN SYSxxx,( X'cuu'          )[,TEMP]
                   ( (address-list) )[,PERM]
                   ( SYSyyy         )
                   ( READER         )
                   ( 1442N1         )
                   ( 2501           )
                   ( 2520B1         )
                   ( 2540R          )
                   ( 2560[,H1]      )
                   (     [,H2]      )
                   ( 2596           )
                   ( 3504           )
                   ( 3505           )
                   ( 3525RP         )
                   ( 5425[,H1]      )
                   (     [,H2]      )
```

The job control statement (// ASSGN) is temporary. It remains in effect only until the next change in assignment or until the end of job, whichever occurs first. The job control command (ASSGN) is permanent. It remains in effect until the next permanent assignment, the DVCDN command, or re-IPL of the system, whichever occurs first. A CLOSE command to a system logical unit on disk or the 3540 diskette also removes a permanent assignment. See also the TEMP override of a permanent ASSGN and the PERM override of a temporary ASSGN.

At the completion of a job, a temporary assignment is automatically restored to the permanent assignment for the logical unit.

The entries in the operand field represent the following.

SYSxxx The symbolic unit name. It can be one of the following. (After supervisor generation, SYSCAT can only be assigned by the CAT command at IPL time.)

SYSRDR
SYSIPT
SYSIN
SYSPCH
SYSLST
SYSOUT [1,2]
SYSLNK
SYSLOG
SYSSLB
SYSRLB
SYSREC
SYSCLB [1, 3]

SYSnnn represents all the other symbolic units in the system. These units vary from SYS000 to SYSmax, where SYSmax represents the highest numbered programmer logical unit available for the system. SYSmax is equal to 255 minus (number of partitions multiplied by 14). Each of these programmer logical units can be assigned to any partition without a prescribed sequence, except when using DAM. For a given partition, the maximum number of programmer logical units is equal to SYSmax minus the sum of all programmer logical units assigned to other partitions.

Notes:

1. Must be permanent assignments, for example, the TEMP option is not permitted for assigning these logical units.
2. Valid for a tape unit only.
3. Only if the system permits private core image libraries.

If a system logical unit is assigned to a tape, DASD, or 3540 diskette, the unit should be closed (using the CLOSE command) before it can be reassigned.

When SYSOUT is assigned, the magnetic tape device must not be the permanent assignment of either SYSLST or SYSPCH. Before assigning a tape drive to a system output unit (SYSOUT, SYSLST, SYSPCH), all previous assignments of this tape drive to any system input units and to any programmer units (input or output) must be permanently unassigned. It is not possible to change the assignment of SYSLOG while a foreground partition is active.

If SYSLNK is assigned to a foreground partition(s), SYSCLB must also be assigned to the same partition(s). Whenever the DLBL and EXTENT information for SYSCLB changes, SYSCLB must be reassigned.

X'cuu' Indicates the channel and unit number (in hexadecimal).

c = 0 to 6 for the channel

uu= 00 to FE (0 to 254) in hexadecimal

(address-list)
You can specify a list of up to seven device addresses in the form X'cuu', separated by commas and enclosed in parentheses. In this case the system searches only the PUB entries referenced in the address list for a free unit, starting with the first specified device address. Once a free unit is found, it is assigned to SYSxxx for the job in which the assignment is made. For disks, if SHR is specified, the first unit in the list is assigned, even if previously assigned.

UA Indicates that the logical unit is to be unassigned. Any operation attempted on an unassigned device cancels the job.

IGN For certain American National Standard and DOS/VS COBOL problem programs (for sequential input files), and for FORTRAN and RPG II, the IGN option unassigns the specified logical unit, and ignores any subsequent logical IOCS command (OPEN, GET, etc.), issued for that unit.

This allows you to disable a logical unit that is used in a program without removing the code for that unit. You can then execute the program as if the unit did not exist. This may be especially helpful when debugging a program.

For assembler language problem programs, IGN indicates that the logical unit is to be ignored. With files processed by logical IOCS, the OPEN to the file is ignored, the DTF table is not initialized (for example, IOREG, extent limits), and the IGNORE indicator is set on in the DTF table. It is your responsibility to check this indicator and bypass any I/O commands (GET, PUT, etc) for this file.

The IGN option is not valid for SYSRDR, SYSIPT, SYSIN, and SYSCLB, nor for PL/I programs. The IGN option can be made temporary by specifying the TEMP option.

Additional information about ignore is in the OPEN (R) section of DOS/VS Supervisor and I/O Macros, GC33-5373. IGN restrictions for American National Standard and DOS/VS COBOL users are given in the associated Program Product publications for the processor being used.

SYSyyy This may be any system or programmer logical unit as shown earlier under the description of SYSxxx. In this case, SYSxxx is assigned to the same device to which SYSyyy is assigned. This type of specification is particularly helpful in the case of disk, because the specification of SYSxxx, SYSyyy is considerably shorter than the full specification.

Example:

```
// ASSGN SYS001,2314,PERM,
         VOL=RAFT01,SHR
// ASSGN SYS003,SYS001
// ASSGN SYSLNK,SYS001
```

device-class
In this case the specification of READER, PRINTER, PUNCH, TAPE, DISK, or DISKETTE is allowed. The system searches the PUB tables for the first unassigned unit of the specified device-class and assigns it to SYSxxx. This type of specification might be used if the exact configuration of the installation is not known or not important. For disks, if SHR is specified, the first unit of the specified device class is assigned, even if previously assigned.

The specific device types to which each device class applies are listed below.

READER 1442N1, 2501, 2520B1, 2540R, 2560, 2596, 3504, 3505, 3525RP, 5425

PRINTER 1403, 1403U, 1443, 3203, 3211, 5203, 5203U

PUNCH 1442N1, 1442N2, 2520B1, 2520B2, 2520B3, 2540P, 2560, 2596, 3525P, 3525RP, 5425

TAPE 2400T7, 2400T9, 3410T7, 3410T9, 3420T7, 3420T9

DISK 2311, 2314/2319, 3330/3333, 3340, 3340R

DISKETTE 3540

device-type
This can be the device code of any supported device-type, such as 2400T9 or 3525RP. In this case the PUB table of the specified device-type is searched for the first free unit. When a free unit is found, it is assigned to SYSxxx. Use this specification if you are interested only in the specific type of device, and not in the physical unit. For disks, if SHR is specified, the first unit of the specified device-type is assigned, even if previously assigned.

Figure 3 shows an example of how the PUB table is scanned with different types of tape specifications in the ASSGN statement/command.

PUB Table		Search Order for Specification		
Phys. Unit	Dev. Type	Tape	2400T9	X'380', X'181', X'1834, X'284'
181	2400T9	1	1	
182	2400T9	2	2	
183	2400T9	3	3	3
281	2400T7	4		
282	2400T7	5		
283	2400T9	6	4	
284	2400T9	7	5	4
380	3410T9	8		1
381	3410T9	9		2
382	3420T9	10		
383	3420T9	11		

Figure 3. How the PUB Table is Scanned

X'ss' Device specifications (used to specify mode settings for 7-track and 9-track magnetic tapes). If X'ss' is not specified at system generation time or at IPL time, the system assumes X'90' for 7-track tapes and X'C0' for 9-track tapes, except for the 3420 for which X'D0' is assumed, specifying the maximum byte density for the device. C0 is the normal reset mode for a 9-track tape unit and specifies the maximum byte density for that device. C8 is an alternate mode setting for 9-track dual density tapes only. For 800 BPI single density 9-track tape, a specification of C8 reduces the time required to OPEN an output file.

The standard mode is entered in the PUB table at system generation or at IPL time. If the mode setting (different from, or the same as the standard mode) is specified in a temporary ASSGN statement, it becomes the current mode setting and is entered as such in the PUB table. When the current job ends, the standard mode is restored in the PUB table. The mode specification in a permanent ASSGN becomes the standard mode. If the X'ss' parameter is not specified for a job, the mode is the same as the standard mode.

The specifications are:

ss	Bytes per Inch	Parity	Translate Feature	Convert Feature
10	200	odd	off	on
20	200	even	off	off
28	200	even	on	off
30	200	odd	off	off
38	200	odd	on	off
50	556	odd	off	on
60	556	even	off	off
68	556	even	on	off
70	556	odd	off	off
78	556	odd	on	off
90	800	odd	off	on
A0	800	even	off	off
A8	800	even	on	off
B0	800	odd	off	off
B8	800	odd	on	off
C0	1600	single density 9-track		
C0	1600	dual density 9-track		
C8	800	single density 9-track		
C8	800	dual density 9-track		
D0	6250	single density 9-track		
D0	6250	dual density 9-track		

Note: The first 15 entries in this table are valid only for 7-track tape. The last six entries are valid only for 9-track tape.

In order to read a 7-track tape backwards, you must first create the tape file with the data convert feature off.

Also, under certain conditions, you are responsible for setting the mode of the tape to be processed. When using PIOCS with dual density tape units, a mode set must be issued if a mode is desired other than the one in which the tape was previously written. You should position the tape at LOAD POINT and issue a SET MODE command, followed by a WRITE command.

ALT Indicates an alternate magnetic tape unit that is used when the capacity of the original assignment is reached. The specifications for the alternate unit are the same as those of the original unit. The characteristics of the alternate unit must be the same as those of the original unit. The original assignment and an alternate assignment must both be permanent or temporary assignments. Multiple alternates can be assigned to a symbolic unit. When SYSIPT is assigned to a magnetic tape device, the file may not be multivolume.

If the original unit is reassigned, the alternate unit must also be reassigned. The ALT operand is invalid for SYSRDR, SYSIPT, SYSIN, SYSLNK, SYSCLB, and SYSLOG.

H1 Indicates that input hopper one will be used for input on the 2560 or 5425. If neither H1 nor H2 is specified, H1 is assumed.

H2 Indicates that input hopper two will be used for input on the 2560 or 5425. H2 cannot be used as input hopper if the 2560 or 5425 is assigned to a partition supported by POWER. Note that hopper specifications are significant only for device independent files associated with the logical units SYSIPT, SYSRDR, SYSIN, and SYSPCH. In all other cases they are ignored. If both hoppers are used, they must be assigned to the same partition. When using the 360/20 Emulator, refer to Model 20 Emulator on System/370: Reference, GC33-5388.

PERM
TEMP Indicates whether the assignment should be permanent (PERM) or temporary (TEMP). It is thus possible to override the // specification or omission.

VOL=volserno
Specifies the volume serial number of the device required. This option may be specified only for tapes and disks.

If VOL is specified, the system searches for the first free unit in the requested sequence and checks the volume label to see if the required disk or tape is mounted. If not, the next free unit is checked, and so on until the proper volume serial number is found or until the end of the specified sequence is reached. The requested volume must be mounted on the unit specified in the message 1T50A MOUNT nnnnnn ON X'cuu'.

SHR This option can be specified only for disk devices and has meaning only in combination with address-list, device-class, and device-type (see corresponding discussions).

BATCH

The BATCH command (Start or Continue Processing) serves to start or continue processing in one of the foreground partitions or to continue processing in the background partition. The function of the BATCH command is exactly the same as that of the START command. If the specified partition is available, job control reads the operator's next command from SYSLOG. When the operator desires to give control to another command input device, he makes an assignment to SYSRDR or SYSIN, and presses the END or ENTER key.

If the specified partition has been temporarily halted by a STOP command, it is made active. If the partition is in operation, it continues, and message

1P1nD AREA NOT AVAILABLE

is issued to the operator. In either instance, attention routine communication with the operator terminates following the BATCH command.

AR Format

BATCH { BG | F1 | F2 | F3 | F4 }

If the operand is omitted, BG is assumed.

CANCEL

The CANCEL command (Cancel Job), when used as a job control command, cancels the execution of the current job in the partition in which the command is given.

When used as an attention command with an operand specified, it cancels the execution of the current job in the specified partition.

JCC Format

CANCEL

AR Format

```
CANCEL { BG }
       { F1 }
       { F2 }
       { F3 }
       { F4 }
```

BG Indicates that the background job is to be canceled.

F1-F4 Indicates that the foreground-one, -two, -three, or -four job is to be canceled.

If one of these operands is specified, the attention routines wait for additional commands from SYSLOG. However, if the operand field is blank, the attention routines assume that the background job is to be canceled. The CANCEL command cannot be used to cancel the partition in which POWER is running.

CLOSE

The CLOSE command (Close Output Unit) is used to close either a system or programmer output logical unit assigned to a magnetic tape, or a system logical unit assigned to a disk or 3540 Diskette.

The CLOSE statement is used to close either a system or programmer logical unit assigned to tape. It applies only to temporarily assigned logical units.

The logical unit can optionally be reassigned to another device, unassigned, or, in the case of a magnetic tape file, switched to an alternate unit. When SYSxxx is a system logical unit (SYSLST, SYSPCH, etc.), one of the optional parameters must be specified. When closing a programmer logical unit (SYS000-SYSnnn), no optional parameter need be specified. When none is specified, the programmer logical unit is closed and the assignment remains unchanged.

Closing a magnetic tape unit consists of writing a tapemark, an EOV trailer record, two tapemarks, and rewinding and unloading the tape. The trailer record contains no block count, and later access by logical IOCS may result in a 4131D message, which can be ignored.

JCS Format

```
// CLOSE SYSxxx [,X'cuu'[,X'ss']]
                [,UA           ]
                [,IGN          ]
                [,ALT          ]
```

JCC Format

```
CLOSE SYSxxx [,X'cuu'[,X'ss']]
             [,UA           ]
             [,IGN          ]
             [,ALT          ]
```

SYSxxx For the CLOSE command only: For disk or 3540 Diskette: SYSIN, SYSRDR, SYSIPT, SYSPCH, or SYSLST

For both the statement and the command: For magnetic tape: SYSPCH, SYSLST, SYSOUT, or SYS000-SYSnnn

X'cuu' Specifies that after the logical unit is closed, it will be assigned to the channel and unit specified. c is the channel number (0-6) and uu is the unit number 00-FE (0-254) in hexadecimal. In the case of a system logical unit, the new unit will be opened if it is either a disk, 3540 Diskette, or a magnetic tape at load point.

X'ss' Device specification for mode settings on 7-track and 9-track tape. The specifications are shown in ASSGN -- Assign Logical Name. If X'ss' is not specified, the mode settings remain unchanged. The LISTIO command may be used to determine the current mode settings for all magnetic tape units.

UA Specifies that the logical unit is to be closed and unassigned.

IGN Specifies that the logical unit is to be closed and unassigned with the ignore option. This operand is invalid for SYSRDR, SYSIPT, or SYSIN.

ALT Specifies that the logical unit is to be closed and an alternate unit is to be opened and used. This operand is valid only for system output logical units (SYSPCH, SYSLST, or SYSOUT) currently assigned to a magnetic tape unit.

DATE

The DATE statement contains the job date that is put in the communication region. It is in either of the two following formats:

JCS Formats

```
// DATE mm/dd/yy
// DATE dd/mm/yy
```

mm = month (01 to 12)
dd = day (01 to 31)
yy = year (00 to 99)

When the DATE statement is used, it applies only to the current job being executed, except for DASD output file labels for which the date from the SET command is used. Job control does not check the operand except for a length of eight characters. If no DATE statement is used, job control supplies the date given in the last SET command.

DLAB

The DLAB statement (DASD label information), completed in a continuation statement, contains file label information for DASD label checking and creation. This statement must immediately follow a volume (VOL) statement. The combination of this statement with VOL and XTENT should not be used to provide the extent and label information for a 3330, 3333, or 3340. For a detailed discussion of DLAB, see DOS/VS DASD Labels, GC33-5375. The DLAB statement cannot be used for VSAM files.

JCS Format

```
// DLAB 'label fields 1-3'          C
      xxxx,yyddd,yyddd,'systemcode'[,type]
```

'label fields 1-3'
: The first three fields of the Format 1 DASD file label are contained just as they appear in the label. This is a 51-byte character string, contained within apostrophes and followed by a comma. The entire 51-byte field must be contained in the first of the two statements. Column 72 must contain a continuation character. The columns between the comma and the continuation character must be blank. The Format 1 label is shown in "Appendix A". Fields 1-3 are:

  File Name. 44-byte alphameric including file ID and, if used, generation number and version number of generation.

  Format Identifier. 1-byte, EBCDIC 1.

  File Serial Number. 6-byte alphameric, must be the same as the volume serial number in the volume label of the first or only pack of the file.

C
: Continuation punch in column 72.

xxxx
: Volume Sequence Number. This 4-digit EBCDIC number is the EBCDIC equivalent of the 2-byte binary volume sequence number in field 4 of the Format 1 label. This number must begin in column 16 of the continuation statement. Columns 1-15 are blank.

yyddd,yyddd
: The file creation date, followed by the file expiration date. These two 5-digit numbers are the EBCDIC equivalent of the 3-byte discontinuous binary dates in fields 5 and 6 of the Format 1 label. yy is the year (00-99), and ddd is the day of the year (001-366).

'systemcode'
: System code is a 13-character string, within apostrophes. For an output file, it is written in field 8 of the Format 1 label. It is ignored when used for an input file. This field is not used by the DOS/VS label processing routines. It is recommended that this field be left blank.

type
: This is a two- or three-character field indicating the type of file, as follows:

  SD for sequential disk or for DTFPH with MOUNTED=SINGLE

  DA for direct access or for DTFPH with MOUNTED=ALL

  ISC for indexed sequential using load create

  ISE for indexed sequential using load extension, add, or retrieve

  If this operand is omitted, SD is assumed.

DLBL

The DLBL statement (DASD label information) replaces the VOL and DLAB statement combination used in previous versions of the system. It contains file label information for DASD or 3540 Diskette label checking and creation. (Programming support for the previous VOL, DLAB, and XTENT combinations will be continued.) Together with the EXTENT statement, only DLBL should be used to supply extent and label information for the 3330/3333, 3340,or 3540. For a detailed discussion of DLBL see DOS/VS DASD Labels, GC33-5375.

JCS Format

```
// DLBL filename,['file-ID'],
   [date],[codes],[data security]
```

Continuation statements or commands are supported for DLBL.

A comma must be inserted for each missing operand if any of the operands following filename are used.

filename
: This can be from one to seven alphameric characters, the first of which must be alphabetic. This unique filename is identical to the symbolic name of the program DTF that identifies the file. For VSAM, filename is identical to (1) dname of the FILE (dname) parameter in an Access Method Services command, and (2) the DDNAME=filename parameter of the Access-Method Control Block (ACB) in the processing program that identifies the file. If the DDNAME parameter is omitted, the filename must be placed in the symbolic name (label) field of the ACB.

'file-ID'
: The unique name associated with the file on the volume. This can be from one to 44 bytes of alphameric data, contained within apostrophes, including file-ID and, if used, generation number and version number of generation. If fewer than 44 characters are used, the field is left-justified and padded with blanks. If this operand is omitted, filename is used. The 3540 Diskette uses a maximum of eight characters in file-ID. For VSAM, file-ID must be specified when an existing (input) file is being processed. The file-ID is identical to the name of the file, specified in the DEFINE command of Access Method Services, listed in the VSAM catalog. When a new VSAM data space or file is being created (defined), the file-ID is ignored if it is specified. For VSAM, the file-ID must be coded according to the following rules:

  - One to 44 alphameric (A-Z, 0-9, @, $, or #) characters or hyphen (-) or plus zero (+0) enclosed in apostrophes (').
  - After each group of eight or less characters, a period (.) must be inserted.
  - No embedded blanks are allowed.
  - The first character of the file-ID and the first character following a period must be alphabetic or notational (A-Z, @, $, #).

date
: This can be from one to six characters indicating either the retention period of the file in the format d through dddd (0-9999), or the absolute expiration date of the file in the format yy/ddd (75/032). If 00/000 is specified, the expiration date is treated as an omitted operand. ddd can also be specified as one to three digits. If this operand is omitted, a 7-day retention period (based on the date entered via the SET command) is assumed. If this operand is present on an input file, it is ignored. For VSAM, this parameter is used instead of the expiration date specified in the DEFINE command of Access Method Services. The expiration date in the DEFINE command is ignored. However, VSAM files or data spaces can only be deleted through the DELETE command of Access Method Services even though the expiration date has been reached.

codes
: This is a two to four character field indicating the type of file label, as follows:

  SD — for sequential disk or for DTFPH with MOUNTED=SINGLE

  DA — for direct access or for DTFPH with MOUNTED=ALL

  DU — for 3540 diskette

  ISC — for indexed sequential using load create

  ISE — for indexed sequential using load extension, add, or retrieve

  VSAM — for all Virtual Storage Access Method files

  If this operand is omitted, SD is assumed.

data security

A three-character field indicating that a data secured file is to be created or processed. At OPEN time, if a data-secured file is accessed, a warning message is issued to the operator who then decides whether or not the file may be accessed.

DSF must be specified for a data secured output file. If it is omitted for an output file, an unsecured file is created. This operand is ignored for the 3540 diskette.

This operand is not required for an input file, and it does not invoke data security if the file was not originally created as a data secured file. For VSAM, this parameter is ignored. All VSAM files are data secured.

DSPLY

The DSPLY command (Display Virtual Storage) allows the operator to display 16 bytes of virtual storage, starting at the specified hexadecimal address, on the device assigned to SYSLOG. Two characters (0-9,a-f) appear on SYSLOG for each byte of information; these characters represent the hexadecimal equivalent of the current information in virtual storage.

AR Format

DSPLY address

address The six digit hexadecimal address, with leading zeros if necessary, at which the storage display starts.

If the specified address is within an invalid address area, the command is ignored and a corresponding informatory message is issued.

If the 16 bytes to be displayed cross the boundary from a valid to an invalid address space, only the bytes in the valid address space are displayed, and a corresponding informatory message is issued.

DUMP

The DUMP command allows the operator to print part or all of the real and/or virtual address area contents on SYSLST. The SYSLST used may be assigned to any partition, but it must be a printer. The printer should not, at the time of the dump, be used by the partition to which it is assigned since this could result in interspersed partition and dump output.

AR Format

	Dump Area Operand	SYSLST Operand
DUMP	blank S BG Fn BGS FnS PDAREA address,address	[(BG)] [(Fn)]

where n = 1, 2, 3, or 4

MUST Be SYSLST & MUST HAVE A LIVE PRINTER ASSIGNED

Dump Area Operand

blank If the dump area operand is omitted, the following is printed:

- the contents of the general registers, and
- the contents of all real and virtual partitions in which programs are currently running.

In the listings produced, the contents of both real and virtual partitions are in consecutive order; invalid address spaces (page pool) are indicated.

S Same as if dump area operand was omitted. The contents of the supervisor area are also dumped.

BG, Fn The contents of the specified partition and its associated registers are printed. If a program is running in real mode in the specified partition, only the real, not the associated virtual partition, is dumped. If a program is running in virtual mode in the specified partition, the virtual partition is dumped, including any fixed pages.

BGS, FnS Same as if BG/Fn was specified. The contents of the supervisor area are also dumped.

PDAREA The contents of the PD table, PD area, and the alternate address area, if present, are printed.

address, address Specifies the start and end addresses of the storage area to be dumped. The contents of the general registers that are associated with the specified storage area are also printed.

If the specified addresses are within an invalid address area, the command is ignored and an informatory message is issued.

If the storage area crosses the boundary from a valid to an invalid address space, only the contents of the specified valid address space are dumped, together with the general registers that are associated with the valid address area. A corresponding informatory message is issued.

If the storage area to be dumped crosses partition boundaries, the specified storage area is dumped, together with those general registers that belong to the partition in which the starting address is located.

SYSLST Operand

BG Fn	The operand indicates the partition to which SYSLST is assigned for output of the dump. If it is omitted, the SYSLST assigned to the background partition is used.

DVCDN

The DVCDN command (Device Down) informs the system that a device is no longer physically available for system operations. If any temporary or standard assignment were made to the device specified in the command, they are unassigned when the command is accepted. Note: The assignment of SYSRDR is changed when a procedure is used.

If the unit is a DASD device or 3540 diskette, issue a CLOSE command for any system logical units currently assigned to it before issuing DVCDN. The DVCDN command unassigns these units without closing them. If a DVCDN command is issued with a system I/O unit assigned to the DASD device or 3540 diskette, closing the file or reassigning it to another DASD device or 3540 diskette is impossible. If an alternate assignment was made for the device specified, the alternate is removed. This command utilizes the logical transient area, and blocks out operator communication functions until it is completed. A DVCUP command must be issued before the device can be used again.

JCC Format

DVCDN X'cuu'

The entry X'cuu' is expressed in hexadecimal form, where c is the channel number (0-6) and uu is the unit number, 00-FE (0-254) in hexadecimal.

DVCUP

The DVCUP command (Device Up) informs the system that a device is available for system operations after the device has been down. As all assignments were removed by the preceding DVCDN command, an ASSGN command must be used to reassign this device.

JCC Format

DVCUP X'cuu'

The entry X'cuu' is expressed in hexadecimal form, where c is the channel number (0-6) and uu is the unit number, 00-FE (0-254) in hexadecimal.

The DVCUP command makes use of supervisor services that prevent other operator communication during execution of this command.

ENDSD

The ENDSD command (End SD Aids) is used to terminate the execution of the SDAID program. It is used in debugging procedures and described in detail in DOS/VS Serviceability Aids and Debugging Procedures, GC33-5380.

AR Format

ENDSD

END OR ENTER

The END or ENTER (End of Communication) command must be issued whenever the operator has finished communicating with the system. It causes the communication routine to return control to the mainline job. END applies to CPU models without DOC (display operator console) support. ENTER applies to CPU models with DOC support.

JCC and AR Format

Press the END or ENTER key.

EXEC

The EXEC command or statement (Execute Program or Procedure) indicates either

- the end of control information for a job step and the beginning of execution of a program, in which case it must be the last command or statement processed before a job step is executed, or
- that a cataloged procedure is to be retrieved from the procedure library by job control. In this case, other commands or statements may follow EXEC.

JCS Format

```
// EXEC[[[PGM=]progname][,REAL][,SIZE=size]]
       [PROC=procedurename[,OV]              ]
```

When issued (either from the console or from the card reader) to execute a procedure, control is given to the card reader at end-of-procedure.

JCC Format

```
EXEC[[[PGM=]progname][,REAL][,SIZE=size]]
    [PROC=procedurename[,OV]             ]
```

When issued to execute a procedure (in this case, accepted from the console only), control is given to the console at end-of-procedure.

PGM=progname
progname
: Represents the name of the program in the core image library to be executed. The program name corresponds to the first or only phase of the program in the library. The program name can be from one to eight alphameric characters (0-9, A-Z, #, $, /, @). The first character must not be numeric. If the program to be executed has just been processed by the linkage editor, the program name is omitted and the PGM keyword cannot be used.

REAL
: Indicates that the job step started by EXEC will be executed in real mode. If REAL is not specified, the job step is always executed in virtual mode.

SIZE=size
: Defines how large a partition is needed for the program about to be executed. The SIZE parameter can be specified in combination with REAL (a) or without REAL (b).

  (a) If specified together with REAL, it specifies the size of that part of the real partition that will be needed by the job step. The remaining part of the real partition is added to the page pool.

      If the SIZE parameter is omitted and REAL is specified, the whole real partition is reserved for the job step.

  (b) If used without REAL, it specifies the size of that part of the virtual partition that will be directly available to the job step.

      For programs (such as compilers) that dynamically allocate storage within the partition for workareas, the SIZE parameter can be used to limit the virtual storage available (and thus reduce paging activity). The remainder of the partition may be used as additional storage for other modules or data required by the program in that partition. The program obtains this additional storage by issuing GETVIS macros with the required amount of storage as a parameter; it releases the storage again by issuing FREEVIS macros.

      If the SIZE parameter is omitted, the whole virtual partition is used for the job initiated with EXEC. SIZE (without REAL) must always be specified for VSAM programs or ISAM programs using the ISAM Interface Program (IIP).

The SIZE parameter can be specified in the following formats:

SIZE=nK
SIZE=AUTO (see Note)
SIZE=(AUTO,nK)

where n must be greater than zero and should be a multiple of 2 (if not, the system rounds the value up to the nearest 2K boundary).

and AUTO indicates that the program size, as calculated by the system from information in the core image directory, is to be taken as the value for SIZE. For a multiple-phase program (where the first four characters of the phase name

are identical), the longest phase is used.

and (AUTO,nK) indicates that job control must take the program size plus nK bytes as the value for SIZE. (If the total is not a multiple of two, the value is rounded up.)

Note: Do not specify SIZE=AUTO for programs that dynamically allocate storage during execution (such as linkage editor, librarian program, and compilers).

PROC=procedurename
Represents the name of the procedure to be retrieved from the procedure library. The procedure name can be from one to eight alphameric characters.

If the procedure name begins with $$, the system substitutes a partition-related character for the second $. The character that is substituted is related to the partition in which the procedure is invoked, that is,

B for the BG partition
1 for the F1 partition
2 for the F2 partition
3 for the F3 partition
4 for the F4 partition.

The procedure corresponding to this name is then retrieved for execution.

Note that the EXEC PROC command can be entered on SYSLOG only (not on SYSRDR), whereas the EXEC PROC statement may be entered on SYSLOG or on SYSRDR.

OV Indicates that overwrite statements follow EXEC. If the EXEC PROC command was used (and entered on SYSLOG), the overwrite statements must also be entered on SYSLOG.

If the EXEC PROC statement was used and entered on SYSRDR, the overwrite statements must be entered on SYSRDR (not on SYSLOG).

If you execute a non-ending job from the procedure library, you cannot update the procedure library.

For more details, refer to the DOS/VS Ststem Management Guide, GC33-5371.

EXTENT

The EXTENT statement (DASD Extent Information) defines each area, cr extent, of a DASD file. One or more EXTENT statements must follcw each DLBL statement except for single input files for sequential disk on a disk or 3540 diskette provided the DEVADDR parameter has been specified in the DTF table. For a detailed discussion of EXTENT, see DOS/VS DASD Labels, GC33-5375. Together with the DLBL statement, only EXTENT should be used to supply extent and label information for the 3330/3333, 3340, and 3540 diskette.

Note: The EXTENT cards should be checked carefully because an invalid field in the card causes the default options or the values entered by the previous EXTENT card to be overwritten by the valid entries of the flagged statement.

Multiple extent cards are valid for system files on the 3540 diskette. Valid parameters are symbolic unit, serial number, and type. The other parameters will be ignored.

This command or statement replaces the XTENT command or statement used in previous versions of the system. (Programming support for XTENT continues.)

JCS Format

```
// EXTENT [symbolic-unit],
          [serial-number],[type],
          [sequence-number],
          [relative-track],
          [number-of-tracks],
          [split-cylinder-track],
          [B=bins]
```

symbolic unit
A six-character field indicating the symbolic unit (SYSxxx) of the volume for which this extent is effective. If this operand is cmitted, the symbolic unit of the preceding EXTENT, if any, is used. If this operand is cmitted on the first or only EXTENT statement, the symbolic unit specified in the DTF is assumed. A symbolic unit included in the extent information for SD, DA, or DU files, however, overrides the DTF DEVADDR=SYSnnn specification. (This operand is nct required for an IJSYSxx filename, where xx is IN, PH, LS, LN, RS, SL, or RL, cr fcr a file defined with the DTF DEVADDR=SYSnnn.) If SYSRDR or SYSIPT is assigned, this operand must be included. This operand is required for VSAM.

In multivolume SD, DA, and DU files, each different symbolic unit must be assigned to a separate physical device. For DA files, the extent statements must be in ascending order.

serial number
From one to six characters indicating the volume serial number of the volume for which this extent is effective. If fewer than six characters are used, the field is left-justified and padded with blanks.

If this operand is omitted, the volume serial number of the preceding EXTENT is used. Therefore, when a multivolume file is being processed, the volume serial number of the first volume is assumed for the entire file, unless you specify this field for the first extent of each following volume. If no serial number was provided in the EXTENT statement, the serial number is not checked and it is your responsibility if files are destroyed because the wrong volume was mounted. This operand is required for VSAM.

For the 3540 diskette, this operand specifies that the associated file will be found on this volume. If the parameter is omitted, the OPEN routines assume that the volume that was mounted is the correct one. Label checking will be done for input files and space will be allocated for an output file.

One extent card must be submitted for each volume of an input file, and sufficient extent cards must be submitted for output files to ensure that enough volumes are present to contain the file.

type
One character indicating the type of the extent, as follows:

1 - data area (no split cylinder)

2 - independent overflow area (for indexed sequential file)

4 - index area (for indexed sequential file)

8 - data area (split cylinder, for SD files only)

If this operand is omitted, type 1 is assumed. Type 1 is the only valid parameter for diskette files.

Note: For indexed sequential files, the extent information should be entered in the following order:

1. Master index sequence number 0 and type 4
2. Cylinder index sequence number 1 and type 4
3. Prime data area sequence number 2 - n and type 1
4. Independent overflow area sequence number n + 1 and type 2

where n is the sequence number of the last prime data area extent.

sequence number
One to three characters containing a decimal number from 0 to 255 indicating the sequence number of this extent within a multiextent file. Extent sequence 0 is used for the master index of an indexed sequential file. If the master index is not used, the first extent of an indexed sequential file has the sequence number 1. The extent sequence number for all other types of files begins with 0. If this operand is omitted for the first extent of ISFMS files, the extent is not accepted. For SD, VSAM, or DA files, this operand is not required. Sequence checking via this parameter is ignored for DU files. Extents are numbered on the label cylinder in the order submitted.

relative track
One to five characters indicating the sequential number of the track, relative to zero, where the data extent is to begin. If this field is omitted on an ISFMS file, the extent is not accepted. This field is not required for SD input files (the extents from the file labels are used). This field must be specified for DA input files.

For VSAM, this operand must be specified when a data space or a file with the UNIQUE option is being created (defined by Access Method Services). This operand is

not required, and it is ignored if it is specified, when a VSAM file is created within an existing data space. In this case, the space for the file is sub-allocated by VSAM from direct-access extents it already owns. This operand is also not required for VSAM input files because the extents are obtained from the VSAM catalog.

When using split cylinder files, this parameter designates the beginning of the split as well as the first track of the file.

Formulas for converting actual to relative track (RT) and relative track to actual for the DASD devices follow.

Actual to Relative

2311 10 x cylinder number + track number = RT

2314/ 2319 20 x cylinder number + track number = RT

2321 1000 x subcell number + 100 x strip number + 20 x cylinder number + track number = RT

3330/ 3333 19 x cylinder number + track number = RT

3340 12 x cylinder number + track number = RT

Relative to Actual

2311 $\frac{RT}{10}$ = quotient is cylinder, remainder is track

2314/ 2319 $\frac{RT}{20}$ = quotient is cylinder, remainder is track

2321 $\frac{RT}{1000}$ = quotient is subcell, remainder1

$\frac{remainder1}{100}$ = quotient is strip, remainder2

$\frac{remainder2}{20}$ = quotient is cylinder, remainder is track

3330/ 3333 $\frac{RT}{19}$ = quotient is cylinder, remainder is track

3340 $\frac{RT}{12}$ = quotient is cylinder, remainder is track

Example: Track 5, cylinder 150 on a 3330 = 2855 in relative track.

number of tracks
: One to five characters indicating the number of tracks to be allotted to the file. For SD input, this field may be omitted. For an indexed sequential file, the number of tracks for prime data must be a multiple of 10 for 2311, of 19 for 3330 or 3333, of 12 for 3340, and of 20 for 2314 or 2319. The number of tracks for a split cylinder file must be the product of the number of cylinders for the file and the specified number of tracks per cylinder for that file.

  For VSAM, this operand must be specified when a data space or a file with the UNIQUE option is being created (defined by Access Method Services). This operand is not required, and it is ignored if it is specified, when a VSAM file is created within an existing data space. In this case, the space for the file is sub-allocated by VSAM from direct-access extents it already owns. This operand is also not required for VSAM input files because the extents are obtained from the VSAM catalog.

split cylinder track
: One or two characters, from 0-19, indicating the upper track number for the split cylinder in SD files.

bins
: One or two characters identifying the 2321 bin for which the extent was created, or on which the extent is currently located. If the field is one character, the creating bin is assumed to be zero. There is no need to specify a creating bin for SD or ISFMS files. If this operand is omitted, bin zero is assumed for both bins. If the operand is included and positional operands are omitted, only one comma is required preceding the key-word operand. (One comma for each omitted positional operand is acceptable, but not necessary.)

HOLD

The HOLD command is used to hold assignments if you want to stop or unbatch a partition.

JCC Format

HOLD { F1[,F2][,F3][,F4] / F4[,F3][,F2][,F1] }

IGNORE

Whenever an abnormal condition arises, the operator will be notified by an appropriate message on SYSLOG. Depending on the situation, he may have to ignore the condition by entering an IGNORE command. This is indicated under 'Operator Action' in DOS/VS Messages, GC33-5379, for each message appearing on SYSLOG.

JCC and AR Format

IGNORE

JOB

The JOB statement indicates the beginning of control information for a job. It is in the following format.

JCS Format

// JOB jobname [accounting information]

jobname The name of the job. Must be one to eight alphameric characters, except blank, equal sign (=), and comma (,). When a job is restarted, the jobname must be identical to that used when the checkpoint was taken. Any user comments can appear on the JOB statement following the jobname (through column 72). If the timer feature is present, the time of day appears in columns 73-100 when the JOB statement is printed on SYSLST. The time of day is printed in columns 1-28 on the next line of SYSLOG.

In both cases the format is

DATE mm/dd/yy,CLOCK hh/mm/ss

accounting information
If the job accounting interface has been specified during system generation, 16 characters of user-specified accounting information can be entered in the JOB statement. This information is moved to the Job Accounting Table. If accounting information is specified, it must be separated from the job name by a single blank. If the job accounting interface is not specified during system generation, accounting information is ignored.

Notes:

1. If the JOB card is omitted from the job stream, no duration and/or date is printed at end of job (when the /& card is read).

2. The start time that the job accounting routines store in byte 36 of the Job Accounting Table is calculated from the values in virtual storage locations 80 and 84.

LBLTYP

The LBLTYP statement (Reserve Storage for Label Information) defines the amount of storage to be reserved at link-edit time or at execution time (for self-relocating programs) for processing of tape and nonsequential disk file labels in the real or virtual address area of virtual storage. It applies to both background and foreground virtual programs. It is to be submitted immediately preceding the // EXEC LNKEDT statement, with the exception of self-relocating programs, for which it is instead submitted immediately preceding the // EXEC statement for the program.

Storage for VSAM label processing is reserved automatically by VSAM routines; an LBLTYP statement is not required.

JCS Format

// LBLTYP { TAPE[(nn)] }
{ NSD(nn) }

TAPE[(nn)] Used only if tape files requiring label information are to be processed, and no nonsequential DASD files are to be processed. nn is optional, and is present only for future expansion. (It is ignored by job control.)

NSD(nn) Used if any nonsequential DASD files are to be processed regardless of other type files to be used. nn specifies the largest number of extents to be used for a single file.

The amount of storage that must be reserved for label information is:

1. For standard tape labels (any number): 80 bytes.

2. For sequential DASD and DTFPH MOUNTED=SINGLE: 0 bytes.

3. For DTFIS, DTFDA, and DTFPH MOUNTED=ALL: 84 bytes plus 20 bytes per extent.

The area reserved is that required by the file with the largest requirement. This area is used during OPEN.

LISTIO

The LISTIO command or statement (List I/O Assignment) causes the system to print a listing of I/O assignments. The listing appears on a SYSLOG (command) or SYSLST (statement). If SYSLST is not assigned, the LISTIO statement is ignored.

JCS Format

```
// LISTIO { SYS    }
          { PROG   }
          { BG     }
          { F1     }
          { F2     }
          { F3     }
          { F4     }
          { ALL    }
          { SYSxxx }
          { UNITS  }
          { DOWN   }
          { UA     }
          { X'cuu' }
```

JCC Format

```
LISTIO { SYS    }
       { PROG   }
       { BG     }
       { F1     }
       { F2     }
       { F3     }
       { F4     }
       { ALL    }
       { SYSxxx }
       { UNITS  }
       { DOWN   }
       { UA     }
       { X'cuu' }
```

SYS — Lists the physical units assigned to all background system logical units.

PROG — Lists the physical units assigned to all background programmer logical units.

BG — Lists the physical units assigned to all logical units of the background partition.

F1-F4 — Lists the physical units assigned to all logical units of the particular foreground partition.

ALL — Lists the physical units assigned to all logical units.

SYSxxx — Lists the physical units assigned to the logical unit specified (invalid for SYSOUT and SYSIN). The assignment is given for the partition from which the command is given.

UNITS — Lists the logical units assigned to all physical units.

DOWN — Lists all physical units specified as inoperative.

UA — Lists all physical units not currently assigned to a logical unit.

X'cuu' — Lists the logical units assigned to the physical unit specified.

Physical units are listed with current device specification for magnetic tape units. Logical units are listed with ownership (background, foreground-one, -two, -three, or -four), when applicable. If a unit has a standard assignment in one mode and a temporary assignment in another mode, the CMNT column identifies the type of assignment for each indicated mode. An example of a listing produced by the LISTIO F1 command is shown in Figure 4. All channel and unit numbers are represented in hexadecimal.

If a standard or permanent assignment is temporarily overwritten, STD in the CMNT (comment) column indicates the permanent assignment, whereas the temporary assignment is printed one line above (see, for example, SYSSLB in Figure 4).

If a device is assigned only temporarily, UA is printed in the STD line (see SYS002 in Figure 4).

ALT in the CMNT column indicates that an alternate tape has been assigned.

LOG

The LOG command causes the system to log, on SYSLOG, columns 1-72 of all job control commands and statements occuring in the partition in which the LOG is issued. The AR LOG affects all the partitions. The LOG function is effective until a NOLOG command for the partition involved is sensed.

The LOG command suppresses the ACANCEL function in the supervisor.

```
// ASSGN   SYSSLB,X'131'
// ASSGN SYS000,X'290'

   ASSGN SYS001,X'280',X'C0'
   ASSGN SYS001,X'281',ALT

// ASSGN SYS002,X'280',X'C0'
// ASSGN SYS003,X'281'
// ASSGN SYS004,X'282',X'C0'
// LISTIO F1
```

```
                  *** FOREGROUND 1 ***

I/O UNIT    CMNT    CHNL    UNIT    MODE

 SYSRDR              0       0C
 SYSIPT              0       0C
 SYSPCH              ** UA **
 SYSLST              0       CE
 SYSLOG              0       1F
 SYSLNK              1       31
 SYSRES              1       30
 SYSSLB              1       31
 SYSSLB      STD     1       30
 SYSRLB              1       30
 SYSREC              1       30
 SYSCLB              ** UA **

                  *** FOREGROUND 1 ***

I/O UNIT    CMNT    CHNL    UNIT    MODE

 SYS000              2       90
 SYS000      STD     ** UA **
 SYS001              2       80      C0
 SYS001      ALT     2       81      C0
 SYS002              2       80      C0
 SYS002      STD     ** UA **
 SYS003              2       81      C0
 SYS003      STD     ** UA **
 SYS004              2       82      C0
 SYS004      STD     ** UA **
 SYS005              ** UA **
 SYS006              ** UA **
 SYS007              ** UA **
 SYS008              ** UA **
 SYS009              ** UA **
 SYS010              ** UA **
 SYS011              ** UA **
 SYS012              ** UA **
 SYS013              ** UA **
 SYS014              ** UA **
 SYS015              ** UA **
 SYS016              ** UA **
 SYS017              ** UA **
 SYS018              ** UA **
 SYS019              ** UA **
 SYS020              ** UA **
 SYS021              ** UA **
 SYS022              ** UA **
 SYS023              ** UA **
 SYS024              ** UA **
```

Figure 4. Example of LISTIO F1 Output

JCC and AR Format

LOG

The operand field is igncred by the system.

MAP

The MAP command produces on SYSLOG a map of the storage areas allocated to programs. It indicates program execution mcde (R,V), and whether a partition is inactive (I) or active (A) for each partition.

JCC and AR Format

MAP

The map of storage areas allocated to partitions is produced in the follcwing format:

AREA	K-REAL	UPPER LIMIT	K-VIRT	UPPER LIMIT	NAME
SP	92K	94207		262144	
BG V5A	30K	124927	68K	331775	MINE
F4 I4	10K	135167	80K	413695	
F3 I3	10K	145407	80K	495615	
F2 I2	14K	159743	100K	598015	
F1 I1	14K	174079	120K	720895	
SVA			64K	786431	
VIS			0K	786431	
PP	86K	262143			

Figure 5. Map of Storage Areas

Note: The cutput does not indicate storage temporarily added to the page pccl as a result of using the SIZE parameter of the EXEC statement.

AREA
- SP = supervisor
- BG, F4, F3, F2, F1 = partition
- SVA = shared virtual area
- VIS = system GETVIS area
- PP = main page pcol
- R = real mode
- V = virtual mcde
- I = inactive partition
- A = active partition (or system directory list has been built in the SVA)
- 1-5 = priority of partition

K-REAL — Shows the number of K bytes allocated in the real address area.

UPPER LIMIT — Shows the highest storage address (in decimal) of each area in the real address area.

K-VIRT — Shows the number of K bytes allocated in the virtual address area.

UPPER LIMIT Shows the highest storage address (in decimal) of each area in the virtual address area. For the supervisor, this field specifies the start address of the virtual address area.

NAME Contains the name of the job that is currently executing in the corresponding partition. This field is blank for the supervisor, SVA, VIS, and main page pool.

For an active partition when no JOB statement or command was entered, the name field contains NO NAME. For an inactive foreground partition, the name field is blank.

MODE

The MODE command allows you to alter the recording mode.

The MODE command provides the following options for controlling recoverable machine check interrupts (MCI):

- The mode of recording for unlabeled and nonstandard labeled tape can be reset.
- The recording mode for a particular device other than a teleprocessing device can be set to intensive or diagnostic, or no recording mode can be specified.
- The mode that the system is operating in (the status of the system) can be requested.
- An EFL threshold value can be specified to override the IBM-supplied value.
- The MODE command can also be used to place the Model 145 control storage ECC in threshold mode.

The MODE command is a notational command. Operands of the MODE can be entered in any order and must be continuous (that is, no blanks are allowed between or within operands). The STATUS operand cannot have any other operand, before or after it.

The total length of the MODE command must not exceed 30 characters.

AR Format

```
        ( IR                                                          )
        ( CR                                                          )
        ( CE,cuu[,I[,xx,y]]                                           )
        (       [,D[,xx,y]]                                           )
        (       [,N       ]                                           )
MODE    (                                                             )
        ( R                                                           )
        ( STATUS                                                      )
        ( HIR    [,M]*{[,R ]                [,E=eeee][,T=tttt]}*      )
        ( ECC    [,C] {[,Q ]                                  }       )
        (             [,TH]                                   )
```

*Note: When either HIR or ECC is specified, at least one of the optional operands must be selected. TH is only valid for the Model 145 when ECC,C is specified with the MODE command.

For a Model 115 or 125, a MODE command is valid only if RMSR is supported. Even then, only the operands IR, CR, and CE may be used. The operands R, STATUS, HIR, and ECC must never be specified for a Model 115 or 125.

The meanings of the operands are:

IR Recording mode for nonstandard
CR labeled and unlabeled tape. Specify Individual Recording (IR) if you wish to record and then reset the tape error statistics at each tape OPEN. Specify Combined Recording (CR) to accumulate all the statistics from nonstandard labeled and unlabeled tape on a specific tape unit until a standard labeled tape is opened. Then one recording of the statistics from all the nonstandard labeled and unlabeled tapes is made on SYSREC, and the statistical counters are reset in the PUB2 table.

CE The recording mode for a device at physical location X'cuu' may be reset. The possible recording modes are:

Normal. The default, normal, is assumed.

I Intensive. Normal recording continues. In addition, the next seven errors of a particular type (xx,y) or the next seven errors of any type (if xx,y is not specified) are recorded. The number of I/O retries required for success is not recorded.

D Diagnostic. Normal recording continues. In addition, the next seven errors of a particular type (xx,y) or the next seven errors of any type (if xx,y is not specified) are recorded. The number of I/O retries required for success is also recorded.

N No recording.

When the recording mode parameter is the last parameter of the MODE command, a check is made to see if all errors are recorded. When in intensive or diagnostic mode, it is possible to check for only one type of error. Indicate the bit to be examined with:

(xx,y) where y is the bit (0-7) and xx the byte (0-31) of sense data to be checked.

STATUS A report is printed on SYSLOG which indicates:

- The type of facility used (HIR,ECC)
- System mode of operation
- Current error count
- Error count threshold
- Current elapsed time
- Time threshold
- Number of buffer pages deleted.

A buffer page is a 32-byte work area in control storage that is used by the Model 135 hardware program.

The status report formats are:

HIR,{R|Q},aaaa/eeee,bbbb/tttt

For the Model 135

ECC,{R|Q}

For the Model 145

ECC,{R|Q},{M|C},aaaa/eeee,bbbb/tttt

where:

aaaa = Current error count
eeee = Error count threshold
bbbb = Current elapsed time
tttt = Total threshold

For the Models 155-II and 158

ECC,{R|Q},aaaa/eeee,bbbb/tttt

BUF DLT=xxx

where:

aaaa = Current error count
eeee = Error count threshold
bbbb = Current elapsed time
tttt = Time threshold
xxx = Total number of inoperable buffer pages deleted.

HIR Hardware Instruction Retry. This operand changes the mode of the HIR facility to R or Q and/or modifies the error count threshold and/or time threshold.

Note: When HIR is placed in quiet mode, ECC, also goes into quiet mode.

ECC Error Correction Code. This operand changes the mode of the ECC facility to R or Q, and/or modifies the error count threshold and/or time threshold. ECC,R and ECC,Q are the only valid modes of diagnosis for the Model 135. If ECC is specified for a Model 145, M or C must also be specified. ECC can also place the Model 145 control storage in threshold mode.

Note: Use of the Error Correction Code (ECC) in full recording mode may cause severe system degradation. Thus, the [ECC,M/C,R] operand combination of the MODE command should only be used by the customer engineer or at his request.

R Recording Mode

MODE R - places both HIR and ECC in recording mode.

MODE HIR,R - places HIR in recording mode.

MODE ECC,R (Models 155-II and 158) - if HIR is already in recording mode, it places ECC in recording mode.

MODE ECC,M,R (Model 145) - if HIR is already in recording mode, real storage is placed in recording mode.

MODE ECC,C,R (Model 145) - if HIR is already in recording mode, control storage is placed in recording mode.

Q Quiet Mode

MODE HIR,Q - places both HIR and ECC in quiet mode.

MODE ECC,Q (Models 135, 155-II, and 158) places ECC in quiet mode.

MODE ECC,M,Q, (Model 145) - places real storage in quiet mode.

MODE ECC,C,Q (Model 145) - places control storage in quiet mode.

M or C Real or control storage: M or C is only valid for the Model 145. M or C must be specified when ECC is specified for the Model 145. M indicates real storage and C control storage.

TH Threshold Mode: on the next occurrence of an ECC control storage error, control storage is placed in quiet mode. TH is only valid for the Model 145 if ECC,C is specified. TH places the Model 145 control storage ECC in threshold mode.

E=eeee Values entered for E and T must
T=tttt be within the following decimal ranges:

E - 8 (initial value) through 9999

T - 8 (initial value) through 9999

The IBM-supplied value is 8.

Note: Whenever HIR is in quiet mode, ECC mode must not be changed.

For the Model 135, the only valid mode commands are:

```
MODE CE,...
MODE STATUS
MODE ECC,Q
MODE ECC,R
```

MSG

The MSG command transfers control to an operator communications routine previously activated by a STXIT command.

AR Format

```
MSG {BG}
    {Fn}
```

Fn indicates the desired foreground partition. BG indicates the background partition; pressing the INTERRUPT key, however, produces the same result for BG.

If the program in the specified partition has not established operator communication linkage, a message is printed on SYSLOG informing the operator of this condition.

MTC

The MTC command or statement controls IBM 2400/3400 series magnetic tape operations. The first operand specifies the operation to be performed.

JCS Format

```
// MTC opcode,SYSxxx[,nn]
```

JCC Format

```
MTC opcode,{X'cuu'}[,nn]
           {SYSxxx}
```

The first operand can be:

Opcode	Meaning
BSF	Backspace one file so tape is positioned for reading the tapemark preceding the file backspaced.
BSR	Backspace record.
DSE	Data security erase.*
ERG	Erase gap (write blank tape).
FSF	The tape is positioned beyond the tapemark following the file spaced over.
FSR	Forward space record.
RUN	Rewind and unload tape.
REW	Rewind tape.
WTM	Write tapemark.

* Data security erase (3400-series only). This command erases a tape from the point at which the tape is positioned when the operation is initiated up to the end-of- tape reflective marker. If data is written after the end-of-tape reflective marker, the data must be erased with [//] MTC ERG SYSnnn.

To ensure that a DSE failure is detected quickly, rewind or rewind-unload should be performed with an MTC rather than manually.

If the DSE command is issued when the tape is at load point, the contents of the tape, including the volume label, are erased completely. In such a case the tape must be reinitialized or a tapemark must be written on it before it can be used again.

The partition that issued the [//] MTC DSE command is placed in the wait state until the end-of-tape reflective marker is reached.

The second operand, SYSxxx, represents any assigned logical unit.

X'cuu' is the channel and unit in hexadecimal where c is the channel number (0-6) and uu is the unit number, 00-FE (0-254). X'cuu' is not valid for JCS.

The optional third entry, nn, is a decimal number (01-99) representing the number of times the specified operation is to be performed. If nn is not specified, the operation is performed once.

NEWVOL

If an assignment specifying VOL= was given for a disk or tape unit and the system cannot find the requested volume on that unit, then the system prints a message on SYSLOG. The message 1T50A requests the operator to mount the desired volume. The partition enters the wait state. After having mounted the proper volume, the operator issues the NEWVOL attention command to indicate that processing may continue with the new volume.

AR Format

NEWVOL [BG / Fn]

If no operand is specified, BG is assumed. Fn can be specified as F1, F2, F3, or F4. If the specified partition is not waiting for a volume to be mounted, an error message is printed on SYSLOG.

NOLOG

The NOLOG command (Suppress Logging) terminates the listing, on SYSLOG, of job control commands and statements (except JOB, PAUSE, STOP, ALLOC, ALLOCR, MAP, HOLD, DVCDN, DVCUP, *, EOJ (/&), and EOP (/+)) that occur in the partition in which the NOLOG is issued. The NOLOG attention command affects all the partitions. The NOLOG function is effective until a LOG command for the partition involved is sensed.

JCC and AR Format

NOLOG

The operand field is ignored by the system.

OPTION

The OPTION statement specifies one or more of the job control options. The format of the OPTION statement is:

JCC Format

// OPTION option1[,option2...]

The options that can appear in the operand field follow. Selected options can be in any order. Options are reset to the standards established at system generation time upon encountering a JOB or a /& statement.

LOG — Lists columns 1-80 of all control statements and commands on SYSLIST. Control statements and commands are not listed until a LOG option is encountered. Once a LOG option statement is read, logging continues from job step to job step until a NOLOG option is encountered or until either the JOB or /& control statement is encountered.

NOLOG — Suppresses the listing of all valid control statements and commands on SYSLST until a LOG option is encountered. If SYSLST is assigned, invalid statements and commands are listed.

DUMP — Dumps the registers and the virtual or the temporary real partition on SYSLST, if assigned, in the case of an abnormal program end (such as program check).

NODUMP — Suppresses the DUMP option.

LINK — Indicates that the object module is to be link-edited. When the LINK option is used, the output of the language translators is written on SYSLNK. The LINK option must always precede an EXEC LNKEDT statement in the input stream. (CATAL also causes the LINK option to be set.) LINK is accepted by job control operating in a foreground partition if NPARTS=2-5 and PCIL=YES is specified during system generation and a private core image library is assigned. The LINK option is reset to NOLINK upon encountering an ASSGN statement or command for SYSLNK.

NOLINK Suppresses the LINK option. The language translators can also suppress the LINK option if the problem program contains an error that would preclude the successful execution of the problem program.

DECK Language translators produce object modules on SYSPCH. If LINK is specified, the DECK option is accepted by the PL/I, FORTRAN IV, American National Standard and DOS/VS COBOL compilers, and the assembler.

NODECK Suppresses the DECK option.

EDECK The assembler punches all valid source macro definitions in edited format on SYSPCH. These macro definitions can be included in sublibrary E of the source statement library.

NOEDECK Suppresses the EDECK option.

ALIGN The assembler aligns constants and data areas on proper boundaries and checks the alignment of addresses used in machine instructions.

NOALIGN Suppresses the ALIGN option.

LIST Language translators write the source module listing on SYSLST. The assembler also writes the hexadecimal object module listing and the assembler and FORTRAN write a summary of all errors in the source program. All are written on SYSLST.

NOLIST Suppresses the LIST option. This option overrides the printing of the external symbol dictionary, relocation list dictionary, and cross reference (XREF) list.

LISTX The ANS and DOS/VS COBOL compilers produce a PROCEDURE DIVISION MAP on SYSLST. The PL/I and FORTRAN compilers produce the object modules on SYSLST.

NOLISTX Suppresses the LISTX option.

SYM The American National Standard and DOS/VS COBOL compilers produce a DATA DIVISION map on SYSLST; the PL/I compiler produces the symbol table on SYSLST; the COBOL compilers produce a DATA DIVISION map on SYSLST.

NOSYM Suppresses the SYM option.

XREF The assembler writes the symbolic cross-reference list on SYSLST.

NOXREF Suppresses the XREF option.

ERRS The FORTRAN, ANS and DOS/VS COBOL, and PL/I compilers summarize all errors in the source program on SYSLST.

NOERRS Suppresses the ERRS option.

ACANCEL This option indicates that the job must be canceled (instead of awaiting operator intervention) if an attempt to assign a device is unsuccessful. This may be due to an undefined device, invalid device status, unassignable unit, or conflicting I/O assignments. At end-of-job, this option is set to the standard setting specified at system generation time.

NOACANCEL Suppresses the ACANCEL option. The system awaits operator intervention in the case of an unsuccessful assignment.

CATAL A phase or program is cataloged in the core image library at the completion of a link-edit run. CATAL also sets the LINK option. CATAL is accepted by job control operating in a foreground partition if NPARTS=2-5 and PCIL=YES is specified during system generation and a private core image library is assigned.

STDLABEL All DASD or tape labels submitted after this point are written at the beginning of the standard label track. Reset to USRLABEL option at end of job or end-of-job step. All file definition statements submitted after this option are available to any program in any partition until another set of standard file definition statements is submitted. STDLABEL is not accepted by job control operating in a foreground partition. All file definition statements following OPTION STDLABEL are included in the partition standard file definition set until one of the following occurs:

1. End-of-job step.
2. End-of-job.
3. OPTION USRLABEL is specified.
4. OPTION PARSTD is specified.

OPTION STDLABEL followed by a /& clears the standard label track. (See Note.)

USRLABEL All DASD or tape labels submitted after this point are written at the beginning of the user label track. (See Note.)

PARSTD All DASD or tape labels submitted after this point are written at the beginning of the partition standard label track. Reset to USRLABEL option at end of job or end-of-job step. All file definition statements submitted after this option are available to any program in the current partition until another set of partition standard file definition statements is submitted. All file definition statements submitted after OPTION PARSTD are included in the standard file definition set until one of the following occurs:

1. End-of-job step.
2. End-of-job.
3. OPTION USRLABEL is specified.
4. OPTION STDLABEL is specified.

OPTION PARSTD followed by a /& clears the partition standard label track.

For a given filename, the sequence of search for label information during an OPEN is the USRLABEL area, followed by the PARSTD area, followed by the STDLABEL area. (See Note.)

48C Specifies the 48-character set on SYSIPT (for PL/I).

60C Specifies the 60-character set on SYSIPT (for PL/I).

SYSPARM= 'string'
Specifies a value for the assembler system variable symbol $SYSPARM. $SYSPARM gets the value of the string, which is enclosed by quotes. The string can contain 0-8 EBCDIC characters. One internal quote must be represented by two. (Job control removes one of them when setting the value.) The surrounding quotes are not included and the length of $SYSPARM is determined by the resulting string.

This operand is invalid if SYSPARM support was not specified when the system was originally generated.

The options specified in the OPTION statement remain in effect until a contrary option is encountered or until a JOB control statement is read. In the latter case, the options are reset to the standard that was established when the system was originally generated.

Any assignment for SYSLNK after the occurrence of the OPTION statement cancels the LINK and CATAL options. These two options are also canceled after each occurrence of an EXEC statement with a blank operand.

Note: Refer to DOS/VS Tape Labels, GC33-5374, and DOS/VS DASD Labels, GC33-5375 for additional information about STDLABEL, USRLABEL, and PARSTD.

OVEND

The OVEND (Overwrite End) statement or command applies to catalged procedures only. It is used to indicate that no more overwrite statements will follow for the respective procedure.

JCS Format

```
// OVEND     [comment]
```

JCC Format

```
OVEND    [comment]
```

For the use of overwrite statements and the rules that apply to temporary procedure modification, refer to the DOS/VS System Management Guide, GC33-5371.

PAUSE

The PAUSE statement causes a pause immediately after processing this statement.

The PAUSE command causes a pause at the end of the current job step.

The PAUSE statement or command always appears on SYSLOG. If only a printer is available, the PAUSE statement or command is ignored. At the time SYSLOG is unlocked for message input, you can continue processing by pressing the END or ENTER key.

JCS Format

```
// PAUSE [any user comment]
```

JCC Format

```
PAUSE [any user comment]
```

The PAUSE command normally causes job control processing to pause at the end of the current job step in the partition specified. Use of the optional operand causes job control processing to pause at end-of-job in the partition specified.

AR Format

```
PAUSE {BG}
      {F1}
      {F3} [,EOJ]
      {F3}
      {F4}
```

For the attention routine, if the first operand is omitted, BG is assumed. The EOJ operand must be preceded by a BG, F1, F2, F3, or F4 operand.

PRTY

The PRTY (priority) command allows the operator (a) to display the priority sequence of the partitions in the system, which was set at system generation, or (b) to change that sequence.

AR Format

```
PRTY
```

This format of the PRTY command displays the priority of all partitions on the device assigned to SYSLOG.

```
PRTY  [p1...,pn]
```

This format of the command changes the priority of the partitions. The number of operands specified must coincide with the number of partitions in the system. The values of the operands are the partition identifiers BG, F1, F2, F3, or F4. The order of operands indicates the new priority sequence, in ascending order. For example

```
PRTY    BG,F3,F1,F2
```

sets the background with the lowest, and foreground-two with the highest priority in a four-partition system.

RESET

The RESET command or statement (Reset I/O Assignments) resets temporary I/O assignments to the standard assignments in the partition in which RESET was submitted. The standard assignments are those specified when the system is generated, plus any modifications made by the operator via an ASSGN command without the TEMP option.

When the physical device affected by RESET is a magnetic tape drive, the current mode set in the PUB table is set to the standard mode set for the device. The standard mode set is established at IPL time and is modified by a permanent ASSGN with an X'ss' parameter.

JCS Format

```
// RESET {SYS   }
         {PROG  }
         {ALL   }
         {SYSxxx}
```

JCC Format

```
      {SYS   }
RESET {PROG  }
      {ALL   }
      {SYSxxx}
```

SYS — Resets all system logical units to their standard assignments.

PROG — Resets all programmer logical units to their standard assignments.

ALL — Resets all logical units to their standard assignments.

SYSxxx — Resets the logical unit specified to its standard assignment. SYSIN or SYSOUT cannot be specified.

ROD

The ROD command (Record on Demand) updates all statistical data record (SDR) counters for all non-teleprocessing devices on the recorder file on SYSREC from the SDR counters in storage. The command must not be issued until all jobs in the partitions in an MPS environment have completed. The ROD command also initializes the writing of the RDE end-of-day (EOD) record on SYSREC. The ROD command has no operand.

Note: This command must not be specified for a Model 115 or 125 that is generated without software recording.

JCC Format

```
ROD
```

RSTRT

The RSTRT statement (Restart Checkpointed Program) is available for checkpointed programs. A programmer can use the CHKPT macro instruction in his program to write checkpoint records. The maximum number of checkpoints that can be taken is decimal 9999. The checkpointed information includes the registers, tape-positioning information, a dump of the program, and a restart address.

The restart facility allows the programmer to continue execution of an interrupted job at a point other than the beginning. The procedure is to submit a group of job control statements including a restart (RSTRT) statement.

JCS Format

```
// RSTRT SYSxxx,nnnn[,filename]
```

SYSxxx Symbolic unit name of the device on which the checkpoint records are stored. This unit must have been previously assigned.

nnnn Identification of the checkpoint record to be used for restarting. This serial number is four characters. It corresponds to the checkpoint identification used when the checkpoint was taken. The serial number is supplied by the checkpoint routine, and printed on SYSLOG when the checkpoint is taken.

filename Symbolic name of the disk checkpoint file to be used for restarting. It must be identical to the filename of the DTFPH to describe the disk checkpoint file and the fifth parameter of the CHKPT macro instruction. This operand applies only when specifying a disk as the checkpoint file.

See DOS/VS Supervisor and I/O Macros, GC33-5373, for further details on the CHKPT macro instruction.

When a checkpoint is taken, the completed checkpoint is noted on SYSLOG. Restarting can be done from any checkpoint record, not just the last. The jobname specified in the JOB statement must be identical to the jobname used when the checkpoint was taken. The proper I/O device assignments must precede the RSTRT control statement.

Assignment of input/output devices to symbolic unit names may vary from the initial assignment. Assignments are made for restarting jobs in the same manner as assignments are made for normal jobs. Care must be taken that a real-mode program is restarted in a real partition and a virtual-mode program in a virtual partition.

SET

The SET command initializes the UPSI configuration, specifies the number of lines to be printed on SYSLST, specifies the remaining disk capacity when SYSLST or SYSPCH is assigned to disk, and defines to the system the status of the recorder file on SYSREC used by the recovery management support recorder (RMSR) features. It also sets the system date, defines the status of the hard copy file for the display operator console (DOC), defines a new size for the SVA, and specifies an SDL in the SVA. The SET card should precede the JOB card in job control sequence.

Note: RCPCH and RCLST operands are ignored if SYSLST or SYSPCH is assigned to a 3540 diskette.

JCC Format

```
SET [UPSI=n1][,LINECT=n2][,RCLST=n3]
    [,RCPCH=n4][,RF=n5][,DATE=n6][,HC=n7]
    [,SVA=n8][,SDL=n9]
```

UPSI=n1 Sets the bit configuration of the UPSI byte in the communications region. n1 consists of one to eight digits, either 0, 1, or X. Positions containing 0 are set to 0; positions containing 1 are set to 1; positions containing X are unchanged. Unspecified rightmost positions are assumed to be X.

LINECT=n2
Sets the standard number of lines to be printed on each page of SYSLST. n2 is an integer between 30 and 99.

RCLST=n3 n3 is a decimal number indicating the minimum number of records remaining to be written on SYSLST when assigned to disk before a warning is issued to the operator that the capacity of the extent is near. It may be any decimal number from 100 through 65535.

Note: This warning is issued only between jobs. If the extent limits are exceeded before the job, this job is terminated.

If no value is given, the system sets RCLST equal to the value specified in the SYSFIL parameter when the system was generated. If no value was specified, the system sets RCLST equal to 1000.

RCPCH=n4 n4 is a decimal number indicating the minimum number of records remaining to be written on SYSPCH when assigned to disk before a warning is issued to the operator that the capacity of the extent is near. It may be any decimal number from 100 through 65535.

Note: This warning is issued only between jobs. If the extent limits are exceeded before the job, this job is terminated.

If no value is given, the system sets RCPCH equal to the value specified in the SYSFIL parameter

when the system was generated. If no value was specified, the system sets RCPCH equal to 1000.

RF=n5 Defines to the system the status of the recorder file (IJSYSRC) on SYSREC used by the recovery management support recorder (RMSR) feature. May only be specified after IPL before the first JOB card.

Note that a SET RF command is ignored if it is given for a Model 115 or 125 without software recording.

n5 can be:

YES Indicates that an active recorder file exists. The system opens this file when the first JOB card is encountered.

CREATE Instructs the system to create a recorder file when the first JOB card is encountered.

DATE=n6 Sets the system date permanently to the specified value. The system date in the communications region of each partition is reset to reflect the new value. This subsequently resets the JOB date when a new job is run. n6 can have the following formats:

mm/dd/yy
dd/mm/yy

mm specifies the month; dd specifies the day; yy specifies the year. The format to be used is the format that was selected when the system was generated.

The DATE parameter may only be specified if the TOD clock is not supported in the system or if the clock is not operational.

HC=n7 Defines to the system the status of the hard-copy file (IJSYSCN) on SYSREC, used to produce hard copy of text that appears on the screen of the Display Operator Console for Model 115 or 125. Each line written on the screen, either by the system or by the operator, is written into IJSYSCN.

n7 can have the following values:

{YES / NO / CREATE}

YES Indicates that a hard-copy file exists in the system and is opened as soon as the first JOB statement is read.

NO Indicates that no recording is to be performed on the hard-copy file.

CREATE Instructs the system to create a hard-copy file; the file is created and opened as soon as the first JOB statement is read.

SVA=n8 Allows the user to change the SVA allocation specified at supervisor generation time. The format of n8 is (nK,nK). The first parameter specifies the size of the SVA (shared virtual area), including the SDL (system directory list), and the system GETVIS area. This size should be an even value and at least 64K. The second parameter specifies the size of the system GETVIS area. This size should be a multiple of 2K and smaller than the size of the SVA. SET SVA may only be specified as the first statement after IPL (or as the first statement of the first procedure).

SDL=n9 The specification of n9 is CREATE, which causes job control to build a system directory list in the SVA. It can also make it possible to load phases into the SVA. SET SDL may only be specified after SET SVA or as the first statement after IPL. SET SDL will not be accepted in a single-partition system.

To build the SDL, job control reads the phasenames that should go into the SDL. These should be specified in subsequent statements each having the following format:

phasename[,SVA]

in which SVA indicates that the phase is to be placed in the shared virtual area if the phase is SVA-eligible. Each entry is 34 bytes long and a maximum of 32K bytes can be entered into the SDL. When this number is exceeded, no more phasenames are accepted and a message is issued to the operator. The last of the phasenames is indicated when a /* statement is encountered. The SET SDL command, phasenames, and /* can be placed in a procedure.

Refer to DOS/VS System Generation, GC33-5377, for details on the IBM SDL procedures distributed with the system.

If the requested phase is not present in the system core image library, a dummy entry is created that is filled when the specific phase is cataloged.

START

The START command (Start or Continue Processing) can be used to start or continue processing in the specified partition. The function of the START command is exactly the same as that of the BATCH command.

AR Format

```
START [BG]
      [F1]
      [F2]
      [F3]
      [F4]
```

BG Job control reads the next control statement from SYSLOG.

F1-F4 Specifies that an inactive foreground partition or a foreground partition that has been stopped by a STOP command is to be restarted. See also the BATCH command.

STOP

The STOP command (Stop Processing) indicates that there are no more jobs to be executed in the partition in which the command is given. It cannot be used in a single-partition system.

JCC Format

STOP

This command removes the partition from the system's task selection mechanism. Job control remains in the partition and can be activated by the START or BATCH attention routine command.

Notes:

1. It may sometimes be advisable to use a STOP command instead of a PAUSE command. The PAUSE command issues a read to SYSLOG, tying it up until the operator responds.

2. The STOP command can be used instead of the combination of HOLD and UNBATCH commands.

TLBL

The TLBL (Tape Label Information) statement replaces the VOL and TPLAB statement combination. It contains file label information for tape label checking and writing. (Programming support for the previous VOL and TPLAB combinations continues.) The TLBL statement may be used with both EBCDIC and ASCII files. For ASCII file processing, the fourth and fifth operands are called set identifier and file section number, respectively. For detailed information about TLBL refer to DOS/VS Tape Labels, GC33-5374.

JCS Format for EBCDIC Files

```
// TLBL  filename,['file-id'],[date],
         [file-serial-number],
         [volume-sequence-number],
         [file-sequence-number],
         [generation-number],
         [version-number]
```

JCS Format for ASCII Files

```
// TLBL  filename,['file-id'],[date],
         [set-identifier],
         [file-section-number],
         [file-sequence-number],
         [generation-number],
         [version-number]
```

filename
This can be from one to seven alphameric characters, the first of which must be alphabetic. This unique filename (within the program) is identical to the symbolic name of the program DTF that identifies the file.

'file-ID'
One to seventeen alphameric characters, contained within apostrophes, indicating the unique name associated with the file on the volume. This operand may contain embedded blanks. On output files, if this operand is omitted, "filename" is used. On input files, if the operand is omitted, no checking will be done.

date Output Files: A one to four numeric character retention period in the format d through dddd (0-9999) can be specified. If omitted, a 0 retention period is assumed. The current system date is always used as the creation date for output files.

Input Files: A four to six numeric character creation date in the format yy/ddd (99/365) can be specified (ddd can be from 1-365). If omitted or a retention date is specified, no checking is done for input files.

file serial number (EBCDIC) or set identifier (ASCII)
: One to six alphameric characters indicating the volume serial number of the first (or only) reel of the file. All six characters must be specified for ASCII files. For EBCDIC files, if fewer than six characters are specified, the field is right justified and padded with zeros. If this operand is omitted on output, the volume serial number of the first (or only) reel of the file is used. If the operand is omitted on input, no checking is done.

volume sequence number (EBCDIC) or file section number (ASCII)
: One to four numeric characters in ascending order for each volume of a multiple volume file. This number is incremented automatically by OPEN/CLOSE routines as required. If this operand is omitted on output, BCD 0001 is used. If omitted on input, no checking is done.

file sequence number
: One to four numeric characters in ascending order for each file of a multiple file volume. This number is incremented automatically by OPEN/CLOSE routines as required. If omitted on output, BCD 0001 is used. If omitted on input, no checking is done.

generation number
: One to four numeric characters that modify the file ID. If omitted on output, BCD 0001 is used. If omitted on input, no checking is done.

version number
: One or two numeric characters that modify the generation number. If omitted on output, BCD 01 is used for EBCDIC files, and BCD 00 for ASCII files. If omitted on input, no checking is done.

TPLAB

The TPLAB (Tape Label Information) statement, which can be used for both EBCDIC and ASCII files, contains file label information for tape label checking and writing. It must immediately follow a volume (VOL) statement. The TPLAB statement contains an image of a portion of the standard tape file label. Label fields 3-10 are always included just as they appear in the label. These are the only fields used for label checking. The additional fields (3-13) can be included, if desired. Field 12 (block count) always defaults to zeros. Field 12 (block count) always defaults to zeros. If specified for an output file, they are written in the corresponding fields of the output label. They are ignored when used for an input file. DOS/VS Tape Labels, GC33-5374, contains additional information about TPLAB.

JCS Format

```
// TPLAB {'label-fields 3-10'}
         {'label fields 3-13'}
```

'label fields 3-10'
: This is a 49-byte character string, included within apostrophes (8-5 punch), identical to positions 5-53 of the tape file label. These fields can be included in one line.

'label fields 3-13'
: This is a 69-byte character string, included within apostrophes (8-5 punch), identical to positions 5-73 of the tape file label. These fields are too long to be included on a single line. The character string must extend into column 71, a continuation character (any character) is present in column 72, and the character string is completed on the next line. The continuation line starts in column 16.

UCS

The UCS command (Load Universal Character Set Buffer) causes the 240-character Universal Character Set contained in the core image library phase specified by phasename to be loaded as buffer storage in the IBM 2821 Control Unit. The 240 EBCDIC characters correspond to the 240 print positions on 1403 chains and trains. A character sent to the printer for printing is matched against the characters in the UCS buffer. When a match occurs, the corresponding chain/train character is printed in the print-line position that the output character occupied. Thus, through the UCS buffer and the many chains/trains available, the 1403 Printer can be adapted to many variable printing applications.

The logical unit must be assigned to an IBM 1403 Printer with the UCS feature. It

is the user's responsibility to assemble, link-edit, and catalog his UCS buffer phases into the core image library, and to mount the new chain or train before the UCS command is executed. The UCS command is not logged on SYSLST.

JCC Format

```
UCS SYSxxx,phasename[,FOLD][,BLOCK]
     [,NULMSG]
```

SYSxxx The name of the logical unit assigned to a 1403 UCS printer to be loaded.

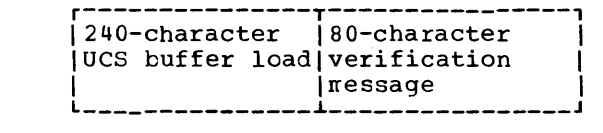
phasename
The symbolic name of the core image library phase containing the 240 EBCDIC characters to be loaded, followed by an 80-character verification message. Each phase may have any valid phasename.

FOLD Signifies that the buffer is to be loaded with the folding operation code in the CCW to permit printing either uppercase or lowercase bit configurations.

BLOCK Signifies that the 2821 latch is to be set to inhibit data checks generated by the 1403 UCS Printer because of print line character mismatches with the UCS buffer.

NULMSG Signifies that the 80-character verification message is not to be printed on the 1403 after the buffer is loaded. If this parameter is not specified after the UCS buffer has been loaded, the program skips to channel 1, issues a print of the last 80 characters in the phase specified by the first parameter, and again skips to channel 1. This is to identify the phase, if the phasename is incorporated in the verification message. If a chain/train can be identified by a unique character, this message can also be used to verify that the mounted chain or train is compatible with the UCS buffer contents, by including this unique character in the verification message.

The UCS phase format is:



UNBATCH

The UNBATCH command terminates foreground processing and releases the partition. UNBATCH is accepted only when no job is in process in the partition and only from SYSLOG. The operator can gain command of SYSLOG following a PAUSE or STOP command or a PAUSE statement. All tape or disk system I/O files must have been closed. Following the UNBATCH command, the attention routine accepts BATCH or START commands for the affected partition. UNBATCH permits storage allocation for the partition to be reduced. This command is valid only for foreground partitions.

JCC Format

```
UNBATCH
```

UPSI

The UPSI (User Program Switch Indicators) statement allows you to set program switches that can be tested. It has the following format.

JCS Format

```
// UPSI nnnnnnnn
```

The operand consists of one to eight characters of 0, 1, or X. Positions containing 0 are set to 0. Positions containing 1 are set to 1. Positions containing X are unchanged. Unspecified rightmost positions are assumed to be X.

Job control clears the UPSI byte to zeros before reading control statements for each job. When job control reads the UPSI statement, it sets or ignores the bits of the UPSI byte in the communication region. Left to right in the UPSI statement, the digits correspond to bits 0 through 7 in the UPSI byte. Any combination of the eight bits can be tested by problem programs at execution time.

VOL

The VOL statement (Volume Information) is used when standard labels for a DASD or tape file are checked unless the DLBL or TLBL statements are used. A VOL statement must be used for each file on a multifile volume (when the DLAB or TPLAB statements are used). The VOL, TPLAB or VOL, DLAB, XTENT statements must appear in that order and must immediately precede the EXEC command or statement to which they apply.

The VOL statement, in combination with the DLAB and XTENT statements, should not be used to supply label and extent information for the 3330/3333 or 3340.

JCS Format

// VOL SYSxxx,filename

SYSxxx Symbolic unit name. The symbolic unit name is taken from the XTENT statement.

filename
This can be from one to seven alphameric characters, the first of which must be alphabetic. This unique filename is identical to the symbolic name of the program DTF that identifies the file.

XTENT

The XTENT statement (DASD Extent Information) defines each area, or extent, of a DASD file. One or more XTENT statements must follow each DLAB statement.

The XTENT statement, in combination with the DLAB and VOL statement, should not be used to supply label and extent information for the 3330/3333 or 3340. The XTENT statement cannot be used for VSAM files.

JCS Format

// XTENT type,sequence,lower,upper,
'serial no.',SYSxxx[B_2]

type Extent Type. One or three columns, containing:

1 = data area (no split cylinder)

2 = overflow area (for indexed sequential file)

4 = index area (for indexed sequential file)

128 = data area (split cylinder). If type 128 is specified, the lower head is assumed to be $H_1H_2H_2$ in lower, and the upper head $H_1H_2H_2$ in upper.

sequence
Extent Sequence Number. One to three columns, containing a decimal number from 0 to 255, indicating the sequence number of this extent within a multiextent file. Extent sequence 0 is used for the master index of an indexed sequential file. If the master index is not used, the first extent of an indexed sequential file has sequence number 1. The extent sequence for all other types of files begins with 0.

lower Lower Limit of Extent. Nine columns, containing the lowest address of the extent in the form $B_1C_1C_1C_2C_2C_2H_1H_2H_2$, where:

B_1 = initially assigned cell number.

0 for disk
0 to 9 for data cell

C_1C_1 = subcell number.

00 for disk
00 to 19 for data cell

$C_2C_2C_2$ = cylinder number.

000 to 199 for disk

or

strip number:

000 to 009 for data cell

H_1 = head block position.

0 for disk
0 to 4 for data cell

H_2H_2 = head number

00 to 09 for 2311
00 to 19 for 2321, 2314, 2319, 3330/3333, 3340.

Although a part of the address (such as B_1 or $C_2C_2C_2$) can be zero, a lower extent of all zeros is invalid.

Note: The last four strips of subcell 19 are reserved for alternate tracks for 2321.

upper Upper Limit of Extent. Nine columns containing the highest address of the extent, in the same form as the lower limit.

'serial no.'
Volume Serial Number. This is a six-byte alphameric character string, contained within apostrophes. The number is the same as in the volume label (volume serial number) and the Format 1 label (file serial number).

SYSxxx This is the symbolic address of the DASD drive.

B_2 Currently assigned cell number.

0 for disk
0-9 for data cell

This field is optional. If missing, job control assigns $B_1=B_2$.

ZONE

The ZONE statement initializes the value of the job zone field in the communication region (bytes 143 and 144). If no ZONE statement is supplied, job control supplies the zone given in the system zone field in the communication region extension (bytes 68 and 69). If no DATE statement is supplied, the job date is updated by means of the values given in the system date field and in the ZONE statement.

Locations that are on Greenwich Mean Time need not specify the ZONE statement or can specify

```
// ZONE EAST/00/00 or
// ZONE WEST/00/00
```

JCS Format

```
// ZONE{EAST} /hh/mm
       {WEST}
```

EAST A geographical position east of Greenwich.

WEST A geographical position west of Greenwich.

hh/mm A decimal value that indicates the difference in hours and minutes between local time and Greenwich Mean Time. hh may be in the range 0-12, mm in the range 0-59.

This statement is only accepted if time-of-day clock support is included in the system. Otherwise, the message 1S0nD INVALID STATEMENT appears on SYSLOG and SYSLST.

/+ -- END-OF-PROCEDURE

The End-of-Procedure statement is /+, unless you specify a different end-of-procedure statement as indicated in the EOP parameter of the CATALP statement. This statement is valid only for catalcged procedures and must be the last statement of each procedure to be cataloged. (For information on the EOP parameter, refer to the CATALP statement in the section Procedure Library: Maintenance and Service Programs.)

JCS Format

```
/+ [comment]
```

Columns 1 and 2 contain a slash (/) and a plus (+). Column 3 must be blank.

As a special delimiter statement, /+ is neither logged nor listed when retrieving a cataloged procedure for inclusion in the job input stream. Instead, the following message appears:

```
EOP procedurename
```

The /+ statement is punched and/or listed only when a procedure is processed by the PSERV program.

/* -- END-OF-DATA FILE

The End-of-Data File statement must be the last statement of each input data file on SYSRDR and SYSIPT.

JCS Format

```
/*
```

Columns 1 and 2 contain a slash (/) and an asterisk (*). Column 3 must be blank. /* causes the channel scheduler to post the end-of-file indicator in the user's CCB. Logical IOCS also recognizes /* when a card reader is assigned to the symbolic units SYS000-SYSnnn.

Note: For an input file on an IBM 5425 MFCU, the /* card must be followed by a blank card.

/& -- END-OF-JOB

This End-of-Job statement must be the last statement of each job.

JCS Format

```
/& [comments]
```

Columns 1 and 2 contain a slash (/) and an ampersand (&) (12-punch). Column 3 must be blank. Upon occurrence of /&, the channel scheduler posts an end-of-file indicator in the user's CCB. If the user attempts to read past the /& on SYSRDR or SYSIPT, the job is terminated. Any comments can begin in column 14 and are printed at end of job. If a job updates a system directory, comments included on the /& statement are not printed.

If time-of-day clock support is provided, the end-of-job statement is printed on SYSLST in the following format: columns 1-3 contain EOJ, columns 5-12 the job name columns 14-72 blanks or any user comments, and columns 73-118 the date, time-of-day, and job duration in the following format:

```
DATE mm/dd/yy,CLOCK hh/mm/ss,
DURATION hh/mm/ss
```

On SYSLOG, the date, time of day, and job duration (the amount of time elapsed between the start and the end of a job) appear in the same format, occupying 46 positions, on the line following the end-of-job statement.

If time-of-day clock support is part of your system, the zone and date values are reset every time this statement is encountered.

Note: The stop time that the job accounting routines stores in byte 40 of the Job Accounting Table is calculated from the values in storage locations 80 and 84.

End-of-job information is not printed on SYSLST if // OPTION NOLOG has been specified. (The NOLOG statement itself is logged on SYSLST).

* -- COMMENTS

This statement can be used as a job control comments statement.

JCS Format

```
* any user comments
```

Column 1 contains an asterisk. Column 2 is blank. The remainder of the statement (through column 72) contains any user comments. The content of the comment statement is printed on SYSLOG. If followed by a PAUSE statement, the statement can be used to request operator action.

JOB CONTROL STATEMENT EXAMPLE

Figure 6 contains six examples of job control statement input. In the discussion that follows, each point corresponds to the number at the left of the two slashes in the job control statements. The PHASE, INCLUDE, and ENTRY statements are linkage editor control statements. These statements are described in detail in the section Linkage Editor. They are included in this discussion to present a more meaningful example.

1. JOB statement for first example.
2. ASSGN statement for the disk with volume serial number 231402.
3. DLBL and EXTENT statements to define ISAM file to be created.
4. EXEC statement for a program in the system core image library to be executed in virtual mode.
5. End-of-job indicator. All temporary symbolic unit assignments reset to the permanent assigns.
6. JOB statement for example 2.
7. ASSGN statements for 3330 disks and tape.
8. DLBL and EXTENT statements to define a sequential disk file with two extents on separate 3330 volumes.
9. EXEC statement for a program in the system core image library that is to be executed in REAL mode, using 60K of the real storage allocated to BGR.
10. MTC (Magnetic Tape Command) to rewind and unload the tape just created.
11. Message to operator concerning the tape.
12. End-of-job indicator.
13. MAP command to print a map of real and virtual storage allocations on SYSLOG.
14. JOB statement for example 3.
15. ASSGN statements to release previous tape assignment, and temporarily assign SYSPCH to that tape.
16. OPTION statement to specify options that are different from those established at System Generation.
17. CATALR statement that will be transferred by Job Control to the SYSPCH file (tape on 380). This tape can then (after creation of the object deck) be used as input to the MAINT program to catalog to the relocatable library.
18. EXEC statement for the system assembler.
19. Source deck as input to the system assembler and /* (end-of-data).
20. MTC commands to write a tapemark and rewind the tape on 381. This tape is now positioned for use as SYSIPT.
21. RESET statement causes SYSPCH to revert to its permanent assignment.
22. Temporary assignment of SYSIPT to tape 381 for use by the librarian program MAINT.
23. EXEC statement for MAINT.
24. MTC command to rewind and unload tape on unit 381.

25. End-of-job indicator with a comment. SYSIPT returns to its permanent assignment.

26. JOB statement for example 4.

27. Permanent assignment of private core image library to 3330 on unit 110.

28. OPTION statement to specify the CATAL function is to take place.

29. PHASE and INCLUDE statements that are input to the linkage editor. The first INCLUDE statement calls the module previously cataloged in the relocatable library and the second (with a blank operand) is followed by an object deck to be included.

30. /* indicates the end of the object deck, not the end of input to the linkage editor.

31. ENTRY statement input to the linkage editor specifying an entry point for the PHASE PROGX03.

32. EXEC statement for the linkage editor.

33. Permanently unassigns the private core image library.

34. End-of-job indicator. At this point the name of the phase cataloged is entered into the private core image library directory.

35. JOB statement for example 5.

36. EXEC statement using cataloged procedures. LIBMAINT is a set of JCL and SYSIPT input in the Procedure Library.

37. End-of-job indicator.

38. JOB statement for example 6.

39. ASSGN statement for SYSLST, which may be any printer.

40. SYS004 should be assigned to a tape on X'380', or X'381' (if X'380' is not available), or X'382' (if X'381' is not available).

41. Assign SYS005 and SYS004 (described in 40).

```
1   // JOB B79ISF                    LOAD ISAM FILE
2   // ASSGN SYS005,DISK,VOL=231402  ISAM BACKUP MASTER -- PREMOUNTED PACK
    // DLBL LOADIS,'FILE8685',,ISC
    // EXTENT SYS005,231402,4,1,200,20
3   // EXTENT SYS005,231402,1,2,300,360
4   // EXEC IS00F
5   /&

6   // JOB U81SDC                    UNLOAD SEQUENTIAL DISK TO TAPE
    // ASSGN SYS004,X'111'           INPUT MASTER FILE
7   // ASSGN SYS005,X'112'           (2 EXTENTS)
    // ASSGN SYS006,X'380',X'C8'     BACKUP TAPE DUAL DENSITY 9-TRACK
    // DLBL SDUNLD,'SEQUENTIAL FILE',73/206,SD
8   // EXTENT SYS004,333002,1,0,1900,380
    // EXTENT SYS005,333003,1,1,76,570
9   // EXEC SD008,REAL,SIZE=60K      RUN IN REAL USING 60K
10  // MTC RUN,X'380'
11  * OPERATOR - TAPE ON 380 - LABEL, REMOVE RING
    *                   AND RETURN TO LIBRARY
12  /&
    * CREATE A MAP OF STORAGE ON SYSLOG
13  MAP

14  // JOB R61ASSM                   OBJECT DECK TO TAPE - CATALOG IN
    *                               RELOCATABLE LIBRARY
    ASSGN SYS012,UA                 CLEAR PREVIOUS TAPE ASSIGN
15  // ASSGN SYSPCH,X'381'           ASSIGN SYSPCH TO TAPE
16  // OPTION DECK,LIST,XREF,NOEDECK
17   CATALR MOD207
18  // EXEC ASSEMBLY
19   (ASSEMBLER SOURCE HERE)
    /*
20  // MTC WTM,SYSPCH,02             WRITE TAPEMARK AND
    // MTC REW,SYSPCH                REWIND SYSPCH TAPE
21  // RESET SYSPCH
22  ASSGN SYSIPT,X'381',TEMP  TO READ MODULE PRODUCED ABOVE -- TEMP ASSGN OVERRIDE
23  // EXEC MAINT
24  MTC RUN,X'381' UNLOAD/REWIND SYSIPT
25  /&                            EOJ R61ASSM

26  // JOB K13CATL                   LINK MODULES INTO A
27  ASSGN SYSCLB,X'110'             PRIVATE CORE IMAGE LIBRARY
28  // OPTION CATAL
       PHASE PROGX03,*
29   INCLUDE MOD207
     INCLUDE
     (OBJECT DECK INCLUDED HERE)
30  /*
31   ENTRY MD207B
32  // EXEC LNKEDT
33  ASSGN SYSCLB,UA
34  /&

35  // JOB E39MANT                   CATALOGED PROCEDURE FOR LIBRARY MAINTENANCE
36  // EXEC PROC=LIBMAINT
37  /&
38  // JOB E40
39  // ASSGN SYSLST,PRINTER          ASSIGN SYSLST TO ANY PRINTER
40  // ASSGN SYS004,(X'380',X'381',X'382') ASSIGN SYS004 TO A TAPE WITHIN THIS RANGE
41  // ASSGN SYS005,SYS004        ASSIGN SYS005 AS SYS004
    // EXEC MYPROG
    /&
```

Figure 6. Job Control Statement Examples

POWER is an automatic SYSIN/SYSPCH/SYSLST spooling processor and priority scheduler for DOS/VS. Using one or more IBM 2311, 2314, 3330, or 3340 disk drives for intermediate storage, POWER can operate up to 26 peripheral devices, maintaining read/punch/print streams for up to four partitions.

This section describes the POWER job entry control language, the central installation console commands, and the POWER RJE (Remote Job Entry) terminal commands.

A summary of all POWER statements and commands is contained in Appendix C.

JOB ENTRY CONTROL LANGUAGE (JECL)

A job entry consists of all the input from a reader logged by POWER under a single name, and may comprise one or more DOS/VS jobs, or one or more DOS/VS job steps. In a writer-only POWER system, each job submitted must use POWER JECL. In a reader-writer POWER system, job entries may be created using either

DOS/VS JCL (Job Control Language), or
POWER JECL (Job Entry Control Language).

If JCL is used, a job entry is logged under the name specified in the // JOB statement. This statement and the /& statement mark the beginning and end of the job entry.

If JECL is used, a job entry is logged under the name in the * $$ JOB statement. The * $$ JOB statement defines the beginning of the job entry, while its end is marked by a * $$ EOJ statement.

Each job entry also receives a unique number. This number, together with the name, identifies the job entry if identical names are used. The operator must use the name and, possibly, the number of a particular job entry whenever he issues an operator command to control the processing of that job entry.

Note that the names ALL, CLASS, FREE, HOLD, LOCAL, and Pn (where n is any number from 0 through 9) must not be used for job entries because they may cause conflicts in the use of certain POWER commands.

FUNCTION OF JECL STATEMENTS

JECL allows you to specify how POWER is to handle a particular job entry. You may, for instance, use JECL statements for the following:

1. Under POWER and POWER RJE
   - assign priorities to determine the order in which the job entries are started.
   - hold a job entry in a reader, printer, or punch queue.
   - spool output to tape rather than to disk.
   - suppress spooling of unit record print or punch output.
   - specify the partition in which the job entry is to be executed.
2. Under POWER RJE only
   - direct output to another user or, on a read-only basis, to all terminal users.
   - direct output to be returned to a terminal or to be processed locally at the central system.
   - hold output until an OUTPUT terminal command is issued.

FORMAT OF JECL STATEMENTS

JECL statements are entered as punched cards within the job stream. Each statement must be completely contained in one punched card; continuation cards are not permitted. The format of JECL statements is shown in Figure 7.

Columns 1-4	5 - 71			72	73-80
* $$	Operation Field (1)	Operand Field (2)	Comments Field (3)	Blank	Sequence Field (4)

* $$ in columns 1 through 4 identify the card as a JECL statement.

(1) The operation field has no fixed length. It may either directly follow the second dollar sign or it may be separated from the second dollar sign by one or more blanks. At least one blank must be placed between the operation and the operand field.

(2) The operand field contains one or more positional parameters separated by commas. The parameters must be inserted in a specific order. If a parameter is omitted, its absence must be indicated by a comma.

The operand field has no fixed length. A blank terminates the operand field; therefore, none of its parameters may contain embedded blanks. If trailing parameters are omitted, trailing commas may also be omitted. If the operation requires an operand field and no parameters are specified, the entire operand field may be omitted. If, in this case, a comment field is present, the omitted operand field is indicated by a comma preceded and followed by blanks.

(3) The comment field may contain any information and has no fixed length.

(4) The sequence field can contain up to eight characters of optional information used for control statement identification. It is not checked by POWER.

Figure 7. Format of JECL Statements

Because JECL statements begin with an asterisk (*), DOS/VS job control will treat the JECL statements as comments when POWER is not used. A * $$ RDR card, however, must be removed if it is not to be used. POWER removes the JECL statements, if used, from the job stream prior to job execution.

Note: Some IBM-supplied program products process DOS/VS job control statements as input data. Jobs containing such data files should be enclosed by a * $$ JOB statement and by a * $$ EOJ statement. In this way, POWER is forced to handle it as one job entry. Jobs containing POWER JECL may never be used as data under POWER. Therefore, any use of JECL as data should take place when POWER is not running.

DESCRIPTION OF JECL STATEMENTS

Figure 8 lists all JECL statements in alphabetical order. This list is followed by a detailed description of each statement and its operands. Examples demonstrating the use of JECL statements are given at the end of this section.

JECL Statement	Function
* $$ DATA	Inserts data from the input reader into a book in a source statement library.
* $$ EOJ	Indicates the end of a job entry.
* $$ JOB	Indicates the beginning of a job entry and provides handling information.
* $$ PRT	Provides disposition and handling information for printed output.
* $$ PUN	Provides disposition and handling information for punched output.
* $$ RDR	Inserts a diskette file into the input stream from a card reader.
* $$ SLI	Inserts data from a sublibrary into the job stream (from the input reader or the reader of a terminal).

Figure 8. JECL Statements

* $$ DATA Statement

The * $$ DATA statement is part of the SLI feature and may be used only if POWER was generated with the SLI (Source Library Inclusion) feature. The * $$ DATA allows you to insert a deck of cards from the reader queue into a book that is retrieved from the source statement library by a * $$ SLI statement. The book must contain * $$ DATA cards at those points where the card decks from the reader queue are to be inserted. POWER suspends reading from the source statement library as soon as it detects a * $$ DATA statement and checks if the next card in the reader queue is a * $$ DATA statement with the same name. If that * $$ DATA statement is found, the cards following the * $$ DATA statement in reader queue (but not the * $$ DATA statement itself) are passed to the partition. Input from the reader queue is terminated when an * or /& jcb control statement is encountered. Source statement library inclusion is then resumed with the card image that follows the * $$ DATA statement in the library book.

If POWER does not find a matching * $$ DATA statement in the reader queue, the * $$ DATA statement in the source statement library is ignored and source library inclusion is resumed immediately.

Format

```
* $$ DATA name
```

name — Specifies the name of the * $$ DATA statement in the reader queue. Must be identical with the name of the corresponding * $$ DATA statement in the source statement library.

* $$ DATA statements must be preceded by a * $$ SLI statement or they are treated as comments. SLI update cards ($SLI in columns 73 through 76) and * $$ DATA cards may be used together. However, they must appear in the job stream in the same order as the corresponding card images appear in the source statement library (refer to Example 5 under "Examples of JECL Statements" in this section).

* $$ EOJ Statement

The * $$ EOJ statement must be used to mark the end of a job entry whose beginning was defined by a * $$ JOB statement. Since a job entry consists of one or more entire job steps in one or more jobs, place it at the end of a DOS/VS job or jcb step.

Format

```
* $$ EOJ (no operand)
```

* $$ JOB Statement

The * $$ JCB statement marks the beginning of a jcb entry and provides job entry handling information. A job entry that is started with a * $$ JOB statement must be terminated by a * $$ EOJ statement.

Format

```
* $$ JOB [name],[H],[pricrity],
        [partition],{userid  }
                    {ALLUSERS}
```

name — Specifies the name by which the job entry is known to POWER. If the job entry contains several DOS/VS jobs, they are logged as a unit in POWER by the name in the * $$ JOB statement. You may specify 'name' as a string of one to eight characters, the first of which must be alphabetic. If 'name' is not specified, POWER assigns AUTONAME as the name of the job entry.

H — Specifies that the jcb entry is to be held in the input queue until it is released by the operator with an R command. If H is not specified, the jcb entry is processed with other job entries of the same priority on a first-in, first-out basis.

pricrity — Specifies the priority assigned to the job entry. It determines the order in which the job entries are started. ('priority' must not be confused with the PRTY parameter in the supervisor generation macro FOPT, which indicates the desired dispatching priority of the partitions.) Specify a value from 0 through 9 as 'priority'. Nine is the highest priority. If 'priority' is omitted, POWER assigns to the job entry a default priority that is based on the POWER generation option PRIORTY. If POWER was generated with PRICRTY=NO, the 'priority' parameter in a * $$ JOB statement is ignored.

partition — Specifies the POWER-controlled partition to which the jcb entry is assigned for execution. It is required only if the jcb entry is read in by a partition-independent reader or an RJE

routine. If the job entry is read in by a partition-dependent reader, the 'partition' parameter is ignored. Specify BG for the background partition and F4, F3, F2, or F1 for the various foreground partitions. If 'partition' is omitted, the first partition specified in the POWPART parameter is assumed.

userid
Specifies the destination for the output when used in conjunction with * $$ PRT and * $$ PUN statements. The specification is used only for RJE. The specification for 'userid' is valid only if it matches with a userid entry in your system.

ALLUSERS
ALLUSERS specifies that the output of the job entry will be available to all RJE users on a read-only basis. Only the central installation operator may purge job entries with the ALLUSERS destination.

* $$ PRT Statement

The * $$ PRT statement provides disposition and handling information for printed output. It must follow either the * $$ JOB or the *$$ PUN statement. Only one * $$ PRT statement is permitted for a job entry, and it pertains to all printed output intercepted by POWER for that job entry, even if the job entry consists of more than one DOS/VS job. Output from all the jobs in the job entry is handled in accordance with the operands of the * $$ PRT statement. If a * $$ PRT statement is not included in the job entry, the default values of the operands are assumed.

Format

```
* $$ PRT [disposition[class]],
        [forms-number]
        ,[number-of-copies]
         [devaddr-of-tape ]
        ,[number-of-lines-before-msg]
        ,[linetab]
```

disposition
specifies the disposition of the printed output during and after execution of the job entry. One of the following options can be specified:

D Spool output to disk.

T Spool output to tape. This option is valid only if POWER was generated with TAPE=YES.

N Do not intercept print requests. This specification suppresses spooling of printed output. When such a job entry is executed, SYSLST must be assigned to a real printer and not to a dummy device. (Do not assign SYSLST to a printer being used by a POWER print writer routine.)

H Spool output to disk and hold it until it is requested by means of an R command (for output on a local printer) or an OUTPUT terminal command (for output on a terminal).

R Return printed output to the terminal user. This option is used only for POWER with RJE.

If 'disposition' is omitted, D is assumed as default value.

class
Specifies the class of the printed output after execution of the job entry. You can specify any letter from A through Z. 'class' can be used in conjunction with 'forms-number' to group printed output by types. A print writer routine may then be started by class to process printed output of the same type. 'class' is valid only if 'disposition' is specified as D. It is ignored for output that is spooled to tape and for output that is directed to an RJE terminal.

forms-number
Specifies the type of forms to be used and must be a string of one to four alphameric characters. If 'forms-number' is omitted, blanks are assumed as the form number. When the output of the job entry is processed and its 'forms-number' is not the same as that of the previous job entry, a message is issued to the operator to tell him that he has to change to forms of the specified number. After having changed the forms, the central installation operator must give a G command to continue processing. If the forms were changed at the terminal printer, the terminal operator must issue a CONTINUE command to continue processing.

number-of-copies
Specifies the desired number of copies of printed output from the job entry. It is specified as a number of one or two digits. If

'number-of-copies' is omitted or if it is specified as 0 or 00, POWER produces one copy of the printed output for the job entry. 'number-of-copies' must be omitted if 'disposition' is specified as T or N. If additional copies are required when 'disposition' is T, start the tape writer as many times as copies are needed.

devaddr-of-tape
: Is only used if 'disposition' is T. It specifies, in the format cuu, the channel and unit address of the tape drive to be used for tape spooling when the job entry is being executed. If this parameter is omitted, the operator must specify the address at the console at execution time. If a job entry contains not only a * $$ PRT statement but also a * $$ PUN statement for tape spooling, each statement must specify a different tape as 'devaddr-of-tape'.

number-of-lines-before-msg
: Is only used for disk spooling and specifies the number of print records that are intercepted by POWER before a warning message is sent to the central installation operator. The parameter is specified as a number of one to six digits. It overrides, for this job entry only, the value specified by the POWER generation option STDLINE. If 'number-of-lines-before-msg' is omitted, the value specified by STDLINE is used.

linetab
: Specifies the carriage control tape format or the forms control buffer that allows the posting of channel 9 and 12 when print requests are intercepted by POWER. The parameter is specified as 26 numeric characters and overrides, for this job entry only, the values specified by the POWER generation option LINETAB. If 'linetab' is omitted, the values specified by LINETAB are used. If POWER was generated without the LINETAB option, 'linetab' is ignored.

  Specify 'linetab' in the form of

  $d_0d_1d_2d_3d_4d_5d_6d_7d_8d_9d_{10}d_{11}d_{12}$

  where d_0 to d_{12} must be two numeric characters. 'd_1' through 'd_{12}' correspond to the punches in the forms control tape, or forms control buffer. Note that the 'linetab' specification for the forms control buffer of a 3203, 3211, or 5203 must correspond to the FCB load format.

  (Refer to the section "System Buffer Load (SYSBUFLD)" for a description of the FCB load under POWER.)

  With POWER, one channel can have only one punch per page, and the channel 12 punch must always be the last one on the page.

  The values of d_0 through d_{12} are calculated as follows:

  - d_1 up to d_{12} must be 00 for each channel without punch. For a channel with punch, it must be the number of the line that contains a channel punch minus one.
  - d_0 specifies the number of lines on the page that follow the line with the channel 12 punch up to the end of the page.

  The total number of lines on a page is:

  $d_0 + d_{12} + 1$

  Note: It is advisable to use the 'forms-number' parameter in conjunction with the 'linetab' parameter. This will cause the writer routine to issue a message and pause, allowing the operator to mount the correct carriage control tape.

* $$ PUN Statement

The * $$ PUN statement provides disposition and handling information for punched output. It must follow either the * $$ JOB or the * $$ PRT statement. Only one * $$ PUN statement is permitted for a job entry and it pertains to all punched output intercepted by the POWER system for that job entry, even if the job entry consists of more than one DOS/VS job. Output from all the jobs in the job entry is handled in accordance with the operands of the * $$ PUN statement. If a * $$ PUN statement is not included in the job entry, the default values of the operands are assumed.

Format

```
* $$ PUN [disposition[class]],[card-number]
       ,[number-of-copies]
        [devaddr-of-tape ]
       ,[number-of-cards-before-msg]
```

disposition
: Specifies the disposition of the punched output during execution and after execution of the job entry. One of the following options can be specified:

  D Spool output to disk.

  T Spool output to tape. This option is valid only if POWER was generated with TAPE=YES.

  N Do not intercept punch requests. This specification suppresses spooling of punched output. When such a job entry is executed, SYSPCH must be assigned to a real card punch and not to a dummy device. (Do not assign SYSLST to a printer that is being used by a POWER print writer routine.)

  H Spool output to disk and hold it until it is released by means of an R command (for output on a local card punch) or an OUTPUT terminal command (for output on a terminal).

  R Return punched output to the terminal user. This option is used only for POWER with RJE.

  If 'disposition' is omitted, D is assumed as default value.

class
: Specifies the class of punched output after execution of the job entry. You can specify any letter from A through Z. 'class' can be used in conjunction with 'card-number' to group punched output by types. A punch writer routine may then be started by class to process punch output of the same type. 'class' is valid only if 'disposition' is specified as D. It is ignored for output that is directed to an RJE terminal.

card-number
: Specifies the type of cards to be used and must be a string of one to four alphameric characters. If 'card-number' is omitted, blanks are assumed as the card number.

  When the output of the job entry is processed and its 'card-number' is not the same as that of the previous job entry, a message is issued to the operator to tell him that he has to change to cards of the specified number. After having changed the cards, the central installation operator must give a G command to continue processing. If the cards were changed at the terminal card punch, the terminal operator must issue a CONTINUE command to continue processing.

number-of-copies
: Specifies the desired number of copies of punched output from the job entry. It is specified as a number of one or two digits. If 'number-of-copies' is omitted or if it is specified as 0 or 00, POWER produces one copy of punched output for the job entry.

  'number-of-copies' must be omitted if 'disposition' is specified as T or N. If additional copies are required when 'disposition' is T, start the tape writer as many times as copies are needed.

devaddr-of-tape
: Is used only if 'disposition' is T. It specifies, in the format cuu, the channel and unit address of the tape drive to be used for the tape spooling when the job entry is being executed. If this parameter is omitted, the operator must specify the address at the console at execution time. If a job entry contains not only a * $$ PUN statement but also a * $$ PRT statement for tape spooling, each statement must specify a different tape as 'devaddr-of-tape'.

number-of-cards-before-msg
: Is used only for disk spooling and specifies the number of punch records that are intercepted by POWER before a warning message is sent to the central installation operator. The parameter is specified as a number from one to six digits. It overrides, for this job entry only, the value specified by the POWER generation option STDCARD. If 'number-of-cards-before-msg' is omitted, the value specified by STDCARD is used.

* $$ RDR Statement

The * $$ RDR statement causes a POWER reader routine to insert a diskette file into the input stream being read from a card reader. The diskette file can contain data and/or job control statements. The * $$ RDR card is placed in the job stream on the card reader at the point where reading from the diskette file is to begin.

Format

```
* $$ RDR [SYSnnn],['filename'],[vols],[S]
```

SYSnnn — Is specified only if the diskette file is to be treated as a data file and not as a SYSIN file. nnn is the programmer logical unit number that will be used to read the file when the job is executed.

If SYSnnn is not specified, the diskette file must consist of card images in the form of 80 or 81 character records. The first character of 81 character records is removed when the record is placed in the DATAFIL. POWER handles JECL and JCL card images from a 3540 as it does cards from a card reader. During execution the diskette file is handled as card input from a SYSIN card device.

If SYSnnn is specified, POWER accepts any diskette file with records from 1 to 128 characters long. No checking for JECL or JCL statements is performed, nor is the first character of 81 character records removed.

The following restrictions apply to programs using spooled diskette files:

- The diskette file must be retrieved using logical IOCS. Physical IOCS is not supported. DLBL and EXTENT cards are required as they would be for a file on a physically present 3540 diskette.
- The programmer logical unit specified in the * $$ RDR card must be used; SYSIN is not allowed.
- Device type specification of the physical (dummy) device must be 3540.
- All the cards before the * $$ RDR card in the card reader must have been read by job control or the program before the diskette file is opened.
- If the SYSIN card reader is accessed while the diskette file is open, the entire spooled diskette file is flushed. Subsequent attempts to read from a diskette file would produce unpredictable results.

'filename' — Is specified as it appears in the HDR1 label on the diskette (up to 8 characters). If this parameter is omitted, POWER reads the first non-protected file found on the diskette currently mounted on the 3540.

vols — Is the maximum number of diskettes to be read. Allowed values are 1-255, default is 1. Reading stops after the specified number of diskettes have been read or after the last diskette of the file has been read.

S — Indicates that volume sequence checking is desired. If the parameter is omitted, no sequence checking is done. The sequence number of the first volume must be 1, that of the second volume must be 2, and so on.

* $$ SLI Statement

The * $$ SLI statement may be used only if POWER was generated with the Source Library Inclusion (SLI) feature. It allows you to insert data from a sublibrary of the source statement library into the job stream.

Format

```
* $$ SLI [sublibrary.]bookname
```

sublibrary — Specifies the sublibrary containing the book that is to be inserted into the job stream. It is specified as one character. If 'sublibrary' is omitted, the character specified in the POWER generation option SUBLIB is assumed as default.

bookname Specifies the name of the book that is to be inserted in the job stream. This is the same name as the name under which the book was cataloged in the source statement library.

When a * $$ SLI statement is encountered in the input stream at execution time, the POWER partition's private source statement library and the system source statement library are searched for the book in the (specified or assumed) sublibrary. If a private source statement library is assigned to the POWER partition, it is searched before the system source statement library. If the book is not found in either library, an error message is issued and a corrected * $$ SLI statement may be entered.

If you wish to include /* and /& statements in the SLI book, you must change the /* statement to a / $$/* statement (columns 1-6) and the /& statement to a * $$/& (columns 1-6) since /* and /& statements are not accepted as data by MAINT. (This is shown in book ASSM under "Examples of JECL Statements" in this section.)

An * $$ SLI statement may be followed by one or more SLI update cards.

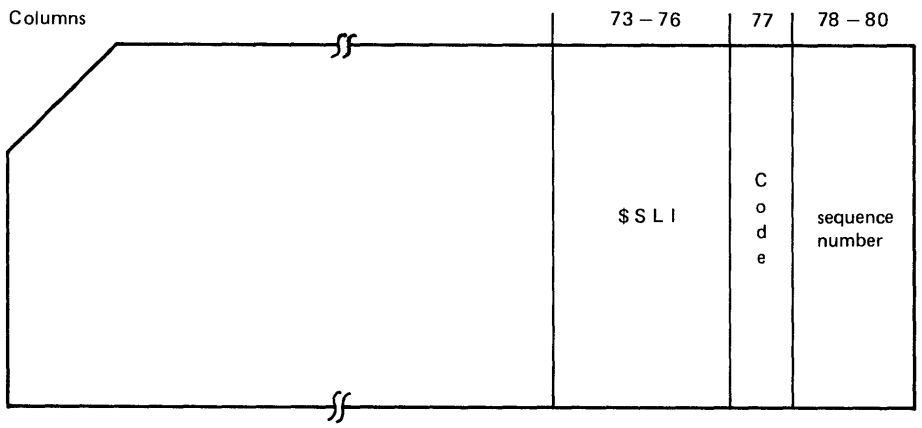
SLI Update Cards

Any source statement library book that is inserted in the job stream and has less than 1000 cards may be updated by means of SLI update cards. The update affects only the cards inserted in the job stream, that is, the contents of the book in the source statement library are not changed.

SLI update cards may be used to insert new cards or to delete or replace existing cards. The actual operation to be performed is specified by a code in column 77. The format of SLI update cards is shown in Figure 9.

Note that SLI update cards must

- Follow the * $$ SLI statement
- Contain $SLI in columns 73-76
- Be in ascending sequence.



Codes

A - Insert card after source statement library card with same sequence number in columns 78-80.

B - Insert card before source statement library card with same sequence number in columns 78-80.

D - Delete source statement library card with same sequence number in columns 78-80.

any other code - Replace source statement library card with same sequence number in columns 78-80 or insert card into job stream at proper sequence point.

Figure 9. Format of SLI Update Cards

EXAMPLES OF JECL STATEMENTS

The following examples illustrate the use of JECL statements.

Example 1 -- Define DOS/VS Jobs as POWER Job Entries

Figure 10 shows three DOS/VS jobs taken from a hypothetical job stream. Job entry number 1 is placed in the reader queue with the generated priority. Job entry number 2 is defined by JECL, which specifies that it is to be placed in the reader queue with priority 5. Job entry number 3, like job entry number 1, has no JECL and is given the default priority.

	POWER Job Entry	DOS/VS Job

// JOB CLEAR DISK
// ASSGN
// ASSGN
// UPSI
// EXEC CLRDK
// UCL
// END
/*
/&
	1	1

* $$ JOB TEST,,5
// JOB ASSEMBLE TEST
// EXEC ASSEMBLY
.
.
.
/*
/&
* $$ EOJ
	2	2

// JOB SORT . . . /&	3	3

Figure 10. JECL Example 1 -- Define DOS/VS Jobs as POWER Job Entries

Example 2 -- Define DOS/VS Job Steps as POWER Job Entries

The job UPDATE in Figure 11 contains four job steps, which are identified by four EXEC statements. Multiple copies are needed of the printed output from steps 3 and 4 (* $$ PRT statements). All job entries are defined by JECL. The fifth * $$ JOB statement specifies explicitly a priority. The first four job entries use the default priority. The operator does not have to stop the printer to set up multiple forms. Output processing will not be interrupted.

```
                                                    |POWER|        |
                                                    |Job  |DOS/VS  |
                                                    |Entry|Job     |
+---------------------------------------------------+-----+--------+
|* $$ JOB UPDATE                                    |     |        |
|// JOB UPDATE                                      |     |        |
|   .                                               |     |        |
|   .                                               |     |        |
|// EXEC DISK                                       |     |        |
|   .                                               |     |        |
|   .                                               |     |        |
|/*                                                 |  1  |        |
|   .                                               |     |        |
|   .                                               |     |        |
|// EXEC PREPARE                                    |     |        |
|* $$ EOJ                                           |     |        |
+---------------------------------------------------+-----+  1     |
|* $$ JOB RECONCIL                                  |     |        |
|* $$ PRT ,,2                                       |     |        |
|   .                                               |     |        |
|   .                                               |     |        |
|// EXEC MATCH MERGE                                |  2  |        |
|   .                                               |     |        |
|   .                                               |     |        |
|* $$ EOJ                                           |     |        |
+---------------------------------------------------+-----+        |
|* $$ JOB NEWLIST                                   |     |        |
|* $$ PRT ,,4                                       |     |        |
|// EXEC LIST                                       |  3  |        |
|/&                                                 |     |        |
|* $$ EOJ                                           |     |        |
+---------------------------------------------------+-----+--------+
|* $$ JOB PRINT                                     |     |        |
|* $$ PRT ,,4                                       |     |        |
|// JOB SSERV                                       |     |        |
|// EXEC SSERV                                      |     |        |
|   .                                               |  4  |  2     |
|   .                                               |     |        |
|/*                                                 |     |        |
|/&                                                 |     |        |
|* $$ EOJ                                           |     |        |
+---------------------------------------------------+-----+--------+
|* $$ JOB PAYROLL,,1    CONFIDENTIAL                 |     |        |
|* $$ PRT T,270A,283    CONFIDENTIAL                 |     |        |
|* $$ PUN T,270B,284    CONFIDENTIAL                 |     |        |
|* OPERATOR -- THIS JOB IS COMPANY CONFIDENTIAL --  |     |        |
|// JOB PAYROLL FOR WEEK ENDING 7/20/73             |     |        |
|// EXEC PAYROLL                                    |  5  |  3     |
|   .                                               |     |        |
|   .                                               |     |        |
|/*                                                 |     |        |
|/&                                                 |     |        |
|* $$ EOJ                                           |     |        |
+---------------------------------------------------+-----+--------+
```

Figure 11. JECL Example 2 -- Define DOS/VS Job Steps as POWER Job Entries

Example 3 -- Define Multiple DOS/VS Jobs as a Single POWER Job Entry

Figure 12 defines two POWER job entries. The first job entry is a job where the input contains DOS/VS job control. Without JECL, POWER would interpret the second // JOB statement as defining a new job entry. Therefore, JECL is required to run this job under POWER.

The second job entry has a low priority and consists of student jobs that are to be run after all the others. Therefore, they are placed collectively in the hold state when they are submitted as one POWER job entry. When they are released by the central installation operator, the output is held until the last DOS/VS job within the job entry has been completed.

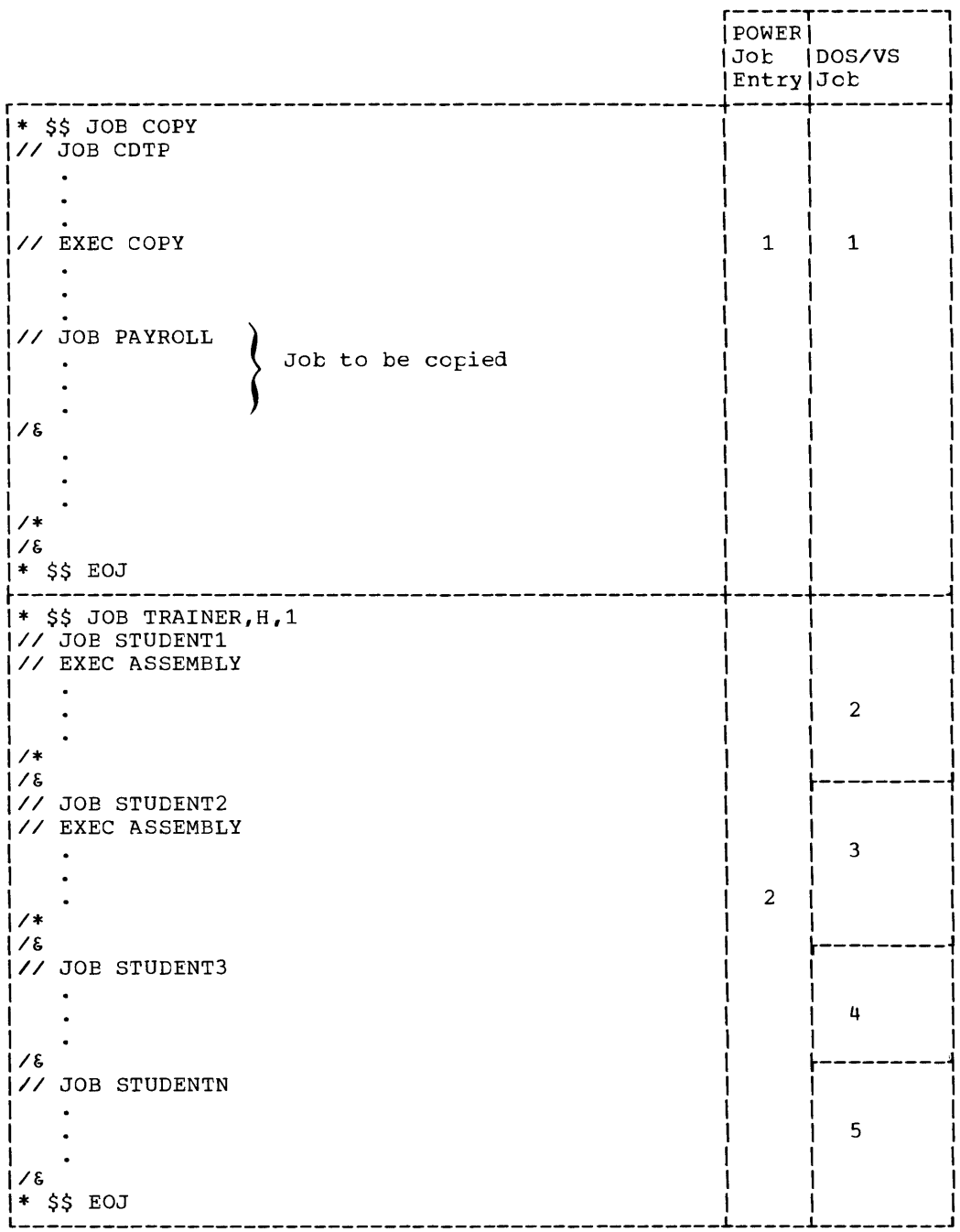


Figure 12. JECL Example 3 -- Define Multiple DOS/VS Jobs as a Single POWER Job Entry

Example 4 -- Simple Use of Source Library Inclusion (SLI) Feature

Figure 13 begins with a job stream consisting of three cards. The * $$ SLI statement causes POWER to search the system source statement library for the book PRNT which is to be contained in sublibrary A. The statements in the book PRNT replace the * $$ SLI statement and are placed in the reader queue for execution.

```
Job Stream Containing a * $$ SLI Statement
* $$ JOB PRINTSLI
* $$ SLI A.PRNT
* $$ EOJ
Book PRNT in System Source Statement Library
   BKEND A.PRNT
// JOB   PRINT                                  PRNT0010
// EXEC  SSERV                                  PRNT0020
   DSPCH A.POWER,A.POWERRES,A.POWERSUP          PRNT0030
   DSPCH A.POWERBUF,A.DSKIO                     PRNT0040
* $$/*                                          PRNT0050
* $$/&                                          PRNT0060
   BKEND
Job Stream Passed to DOS/VS for Execution
// JOB   PRINT                                  PRNT0010
// EXEC  SSERV                                  PRNT0020
   DSPCH A.POWER,A.POWERRES,A.POWERSUP          PRNT0030
   DSPCH A.POWERBUF,A.DSKIO                     PRNT0040
/*                                              PRNT0050
/&                                              PRNT0060
```

Figure 13. JECL Example 4 -- Simple Use of Source Library Inclusion (SLI) Feature

Example 5 -- Use of * $$ DATA Statement and SLI Update Cards

A private source statement library has been assigned to the POWER partition. Figure 14 begins with a job stream which references the private source statement library assigned to the POWER partition. In addition, the job stream contains SLI update cards to update the book from the source statement library and a * $$ DATA statement to insert data in the book to be retrieved.

The private source statement library is searched for the book named ASSM in sublibrary B. The statements in book ASSM replace the * $$ SLI statement. However, statements ASSM0020, ASSM0100, and ASSM0120 are replaced by the corresponding SLI update cards in the input stream.

When the * $$ DATA statement in book ASSM is encountered, POWER tests if the input stream contains a * $$ DATA statement with the same name (INPUTA). Since this is the case, the * $$ DATA statement in book ASSM is replaced by the three cards that immediately follow the * $$ DATA statement in the input stream. The job stream is placed in the reader queue for execution.

Note that the * $$ DATA statement and the SLI cards in the input stream must appear in the same order in which the corresponding card images appear in the source statement library.

```
Job Stream Containing SLI Update and Data Cards
* $$ JOB    ASSEMBLE
* $$ SLI    B.ASSM                          (SLI statement)
// ASSGN    SYSPCH,X'182'                   (update card)          $SLI0020
* $$        DATA INPUTA                     (DATA statement)
   DEFAULT  POWER                           (data card)
            END                             (data card)
/*                                          (data card)
// ASSGN    SYSIPT,X'182'                   (update card)          $SLI0100
   MTC      RUN,X'182'                      (update card)          $SLI0120
* $$        EOJ
Book ASSM in the Private Source Statement Library
   BKEND    B.ASSM
// JOB      ASSEMBLE                                               ASSM0010
// ASSGN    SYSPCH,X'180'                                          ASSM0020
// EXEC     ASSEMBLY                                               ASSM0030
* $$ DATA  INPUTA                          (replaced by data cards)ASSM0040
// MTC      WTM,SYSPCH                                             ASSM0050
// MTC      WTM,SYSPCH                                             ASSM0060
// MTC      REW,SYSPCH                                             ASSM0070
* $$/&                                                            ASSM0080
// JOB      CATALOG                                                ASSM0090
// ASSGN    SYSIPT,X'180'                                          ASSM0100
// EXEC     MAINT                                                  ASSM0110
   MTC      RUN,X'180'                                             ASSM0120
* $$/*                                                            ASSM0130
* $$/&                                                            ASSM0140
// JOB      LINK                                                   ASSM0150
// OPTION   CATAL                                                  ASSM0160
   INCLUDE  DEFAULT                                               ASSM0180
   ENTRY    INIT                                                  ASSM0190
* $$/*                                                            ASSM0200
// EXEC     LNKEDT                                                 ASSM0210
* $$/&                                                            ASSM0220
   BKEND
Job Stream Passed to DOS/VS for Execution
// JOB      ASSEMBLE                                               ASSM0010
// ASSGN    SYSPCH,X'182'                   (updated)
// EXEC     ASSEMBLY                                               ASSM0030
   DEFAULT  POWER  }                        inserted by
            END    }                        DATA feature
/*
// MTC      WTM,SYSPCH                                             ASSM0050
// MTC      WTM,SYSPCH                                             ASSM0060
// MTC      REW,SYSPCH                                             ASSM0070
/&                                                                ASSM0080
// JOB      CATALOG                                                ASSM0090
// ASSGN    SYSIPT,X'182'                   (updated)
// EXEC     MAINT                                                  ASSM0110
   MTC      RUN,X'182'                      (updated)
/*                                                                ASSM0130
/&                                                                ASSM0140
// JOB      LINK                                                   ASSM0150
// OPTION   CATAL                                                  ASSM0160
   INCLUDE  DEFAULT                                               ASSM0180
   ENTRY    INIT                                                  ASSM0190
/*                                                                ASSM0200
// EXEC     LNKEDT                                                 ASSM0210
/&                                                                ASSM0220
```

Figure 14. JECL Example 5 -- Use of DATA Statement and SLI Update Cards

Example 6 -- Use of * $$ RDR Statement to Insert Data from IBM 3540 Diskette I/O Unit into a Card Input Stream

Assume that the job control statements for a job MIXEDIN are submitted from the card reader (00C) and that the data to be processed in the job are contained in a file KEYENTRY on two diskette volumes mounted on a 3540 at address 00B. The operator enters the command

```
S BGRDR,00C,1,00B
```

which tells POWER to start a reader routine using one buffer to the card reader at address 00C with the ability to read from a 3540 at address 00B. The 3540 belongs to this reader routine and cannct be used by any cther partition cr POWER rcutine until the reader routine has terminated.

The placement of the * $$ RDR card within the control statements submitted frcm the card reader is shown in Figure 15.

```
Cards in Card Reader 00C

(1) // JOB MIXEDIN

(2) // ASSGN SYS008,X'01B'

(3) // DLBL FILEA,'KEYENTRY',,DU
    // EXTENT SYS008
    // EXEC MIXEDIN

(4) * $$ RDR SYS008,'KEYENTRY',2
    /*
(1) /&
```

(1) JECL can be used in addition to DOS/VS JCL.

(2) Assigns SYS008 to the dummy 3540.

(3) Label information needed when the user opens his diskette file. SYS008 need not be specified in the EXTENT card if DEVADDR=SYS008 was specified in the DTFDU macro.

(4) This card tells the POWER reader routine to suspend card reading and read up to two diskettes of a data file named KEYENTRY. When the end of the KEYENTRY file is reached, card reading resumes. When reading from the diskette, the reader routine will use enough data buffers as I/O areas tc hold cne track of diskette data; when reading cards, it uses the number of buffers specified in the S command.

Figure 15. JECL Example 6 -- Insert Data frcm a Diskette into a POWER Job being read from a Card Reader

Example 7 -- Use of a * $$ RDR Statement to Insert Card Images from a 3540 Diskette File into a Card Input Stream

As in example 6 the operator enters the command

S BGRDR,00C,1,00B

to start a reader routine reading from a card reader and a 3540 diskette.

Cards in the Reader	Cards in the 3540 File 'CARDFILE'

(1) // JOB CATAL
// OPTION CATAL
* $$ RDR ,'CARDFILE',1	

(2) ----------→	// EXEC ASSEMBLY . . END (End of diskette file)
(3) /* // EXEC LNKEDT /* . .	

(1) The reader routine reads cards until it encounters a * $$ RDR card specifying a diskette file.

(2) The file in the * $$ RDR card is then read in from the diskette mounted on the 3540 until end-of-file is reached or until the volume count is exhausted. Note that the parameter 'SYSnnn' must be omitted for the diskette file to be inserted as card images.

(3) Reading from the card reader is then resumed until the next * $$ RDR card is encountered or until end-of-file on the card reader is reached.

Figure 16. JECL Example 7 -- Use of a * $$ RDR Statement to Insert Card Images from a 3540 Diskette File into a Card Input Stream

CENTRAL INSTALLATION CONSOLE COMMANDS

The central installation console commands allow you to control the POWER and POWER RJE system from the operator's console. They are entered in the same way as attention commands.

FUNCTION OF CENTRAL INSTALLATION CONSOLE COMMANDS

Operations performed by the console commands may be divided into four groups:

1. Routine and system management:

   S (Start routine)
   P (Stop routine)
   G (Reactivate routine or partition)
   C (Cancel routine)
   F (Flush job entry output)
   M (Display or alter copy counter)
   T (Restart job entry output)
   E (Terminate or cancel POWER program)

2. Queue management:

   A (Alter job entry priority)
   D (Display status of job entry)
   H (Hold job entry)
   I (Delete job entry)
   R (Release job entry)
   J (Process ACCTFIL)

3. RJE management:

   B (Send, delete, or display messages)
   I (Inquire about status of RJE routine)
   O (Change output destination of a job entry)
   S (Start RJE routine)
   P (Stop RJE routine)
   G (Reactive RJE routine)
   D (Display status of RJE job entry)

4. Diagnostics:

   Z (Trace TIB, QFILE, or DATAFIL access by POWER)

FORMAT OF CENTRAL INSTALLATION CONSOLE COMMANDS

The console commands consist of two fields: the operation field and the operand field.

Operation Field. This field specifies a single letter which defines the operation to be performed. Any number of blanks may precede the operation field. If operands are specified, they must be separated from the operation field by at least one blank.

Operand Field. This field contains one or more positional parameters separated by commas. A blank terminates the operand field. The only exception is the B command, where blanks may appear as part of the message text operand.

DESCRIPTION OF CENTRAL INSTALLATION CONSOLE COMMANDS

This section lists all the console commands in alphabetical order. A summary of the console commands is contained in "Appendix D".

A Command (Alter)

The A command alters the priority of job entries in the queue. It is ignored if POWER was generated with PRICRITY=NO.

Format

```
A  queue,name,[number],priority
```

queue — specifies the queue to which the command is directed in the xxyyy format, where

xx = BG, F4, F3, F2,
yyy = RDR, PRT, or PUN

name — specifies the name of the job entry.

number — specifies the number assigned to the job entry by POWER when it is inserted in the input queue. The number may be obtained by using the D command. It may consist of up to five numeric characters and allows the addressing of different job entries that have identical names.

priority — specifies the priority the job entry is to assume. It is specified by a numeric character from 0 to 9. Nine is the highest priority.

The A command changes the priority of a job entry after it has been inserted in the POWER queues. For a job entry in the input queue (RDR), the change determines when the job entry will be processed by DOS/VS. For output, the command changes the sequence in which the job entries are processed by the writer routines.

Examples

```
A  BGRDR,ASSEMBLY,016,3
A  F2PUN,OBJECT,,0
```

B Command (Broadcast)

The B command enables the central installation operator to communicate with remote terminals. Messages may be submitted for a specific terminal or for all terminals.

Messages are grouped and are given numbers within the groups. There is one group for each 'userid' and 'termid'. An additional group, called 'ALLUSERS' consists of messages addressed to all users.

The B command permits you to

- Add a message to one group.
- Delete one message, all messages of a group, or all messages.
- Display one or all messages of a group on SYSLOG.

When a message is added, it is given the next higher number within its group. When a message is deleted, the messages of the group are renumbered. Therefore, the actual message numbers can be obtained only by displaying an entire group.

Format

1. Message option:

```
B  M, {termid  } ,'msg'
      {userid  }
      {ALLUSERS}
```

2. Delete option:

```
      {termid  } [,nr]
      {userid  } [,nr]
B  L, {ALLUSERS} [,nr]
      {ALL     }
```

3. Display option:

```
B  D, {termid  } [,nr]
      {userid  }
      {ALLUSERS}
```

B Specifies the B command option desired.

M Causes the specified messages to be added to the specified message group.

L Causes the specified message, all of the messages of a group, or all messages to be deleted.

D Causes the specified message or all of the messages in a specified group to be displayed on SYSLOG.

termid, userid, ALLUSERS, ALL — Specifies the group in the RJE message queue to which the B command option applies. 'termid' and 'userid' are valid if they are entries in the userid list (see 'Userid List Generation' in DOS/VS System Generation, GC33-5377), which is created when POWER/RJE is generated. ALLUSERS specifies those messages to be broadcast to all users. ALL specifies the entire message queue.

msg — Specifies the message to be added to the specified group. The message may consist of up to 40 characters, enclosed in single quotation marks. If the message text contains a quotation mark, type in two quotation marks for each that is to appear in the message.

Operator messages to termids can be retrieved at the remote terminal with the command

```
* .. RJSTART termid,BRDCST,...
```

Messages to a userid can be retrieved by the command

```
* .. BRDCSTR
```

Messages addressed to termids and userids are deleted after delivery.

nr — Specifies the number of a specific message in the RJE message queue. 'nr' is specified as one or two numeric characters from 1 to 99. If this operand is omitted, all messages for the specified 'userid', 'termid', or 'ALLUSERS' are assumed.

To perform its functions, the B command requires a data buffer. If a data buffer is not available when the B command is used, a message to this effect will appear on SYSLOG and the command will be ignored.

Examples

```
B  M,NEWYORK,'RJE CEASES AT 14.00 TODAY,
   4/18/73'
```

This is a message to one specific terminal.

```
B  D,NEWYORK      Display all messages to
                    New York
B  D,DENVER,3     Display message No. 3 to
                    Denver
B  D,ALLUSERS     Display messages to
                    all users
B  D,ALLUSERS,4   Display message No. 4 to
                    all users
B  L,CHICAGO      Delete all messages to
                    Chicago
B  L,LONDON,1     Delete message No. 1 to
                    London
B  L,ALLUSERS     Delete all messages to
                    all users
B  L,ALLUSERS,6   Delete message No. 6 to
                    all users
B  L,ALL          Delete the entire message
                    queue
```

C Command (Cancel)

The C command cancels a reader or writer routine.

Format

```
C {queue[,ioaddr]}
  {loaddr        }
```

queue — Specifies the reader or writer routine in the xxyyy or yyy format, where

xx = BG, F4, F3, F2, or F1
yyy = PRT, PUN, or RDR

A specification in the yyy format specifies a partition-independent reader/writer routine.

If 'queue' is omitted, POWER cancels the routine that is active on the device specified by 'loaddr'.

ioaddr — Specifies the address of the I/O device for which the routine was started in the cuu or X'cuu' format. 'icaddr' may be omitted only if the AUTOSTR generation option is specified. If the reader routine was started to a card reader and a 3540, specify the card device for cuu.

When a reader routine is reading input, the C command terminates processing, and the job entry affected by the command must be reentered.

For reader routines using the 5425, see the note under the P command.

When a writer routine is punching or printing output, the C command terminates output processing, and the output of the job entry affected by the command is deleted from the output queue.

POWER acknowledges the C command with the message

1Q77I STOPPED xxycuu

where y = R for a reader routine
T for a print writer routine
P for a punch writer routine

Examples

1. Cancel reader routine:

```
C BGRDR,00C
C RDR,00C
C X'00C'
```

2. Cancel writer routine:

```
C BGPRT,00E
C F2PUN,X'00D'
C 00E
```

D Command (Display)

The D command (1) provides you with status information on the running POWER system, or (2) displays the status of job entries in a specified queue. The information is displayed on SYSLOG.

Format

1. Provide information on running POWER system:

D { A / B / Q / T }

A Specifies a request for a list of all reader, writer, and RJE routines currently active. Each entry in the list appears in the format 1Q20I xxycuu where

xx = BG, F4, F3, F2, or F1
XX for partition-independent routines

y = R for a reader routine
T for a print writer routine
P for a punch writer routine

xxy = RJE for RJE routines

cuu = device address of unit record device

If no routines have been started, the message

1Q12I NO ACTIVE ROUTINES

is issued.

B Specifies a request for a display of the number of program and data buffers in the system not currently in use. The report is in the format

1Q14I xx PROGRAM BUFFERS
1Q15I xx DATA BUFFERS

Q Specifies a request for the number of free QFILE records and track groups. The report is in the format

1Q10I xxxx TRACK GROUPS
1Q11I xxx QFILE RECORDS

T System time and date. These are issued in the format

1Q16I TIME = xx/xx/xx,
DATE = xx/xx/xx

2. Display status of job entry:

D queue { ,name[,number] / [,ALL] / ,HOLD / ,priority / ,class / ,FREE / ,LOCAL / ,RJE }

queue Specifies the queue to which the command is directed in the xxyyy or yyy format, where

xx = BG, F4, F3, F2, or F1
yyy = RDR, PRT, or PUN

A specification in the yyy format indicates a partition-independent display.

name Specifies the name of the job entry.

number Specifies the number assigned to the job entry by POWER when it is entered in the input queue. Job entry numbers may consist of from one to five numeric

characters; it allows addressing of specific job entries with identical names.

ALL — Specifies a general request for status information on all job entries in the specified queue.

HOLD — Specifies a general request for status information on all job entries in the 'hold' state in the specified queue.

priority — Specifies a general request for status information on all job entries in the queue with the specified priority. Priority is specified by Pn, where n is a numeric character from 0 through 9. Nine is the highest priority.

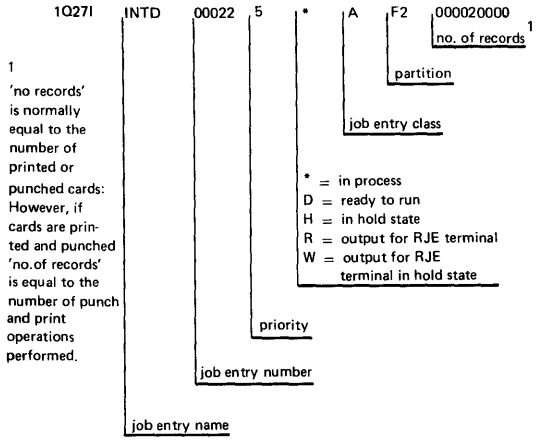
class — Specifies a general request for status information on all job entries belonging to the specified class. Class is specified by CLASSn, where n is any alphabetic character from A through Z.

FREE — Specifies a general request for status information on all job entries of the specified queue(s) that are not in the 'hold' state.

LOCAL — Applies only to POWER with RJE; it specifies a general request for status information on those job entries of the specified queue(s) that were submitted at the central installation.

RJE — Specifies that the command applies to RJE job entries in the specified queue.

The example below shows the format of the status report:



The report obtained for RJE job entries looks the same as the report for local routines, with one exception: the former lists the destination of the RJE job entries ('termid', 'userid', 'ALLUSERS').

Examples

```
Command: D BGRDR,ASSEMBLY,10
Report:  1Q27I ASSEMBLY 00010 2 C0000103
Command: D BGPRT,CLASSA
Report:  1Q27I REPORTA 00022 5 * A 00002000
Command: D PRT,FREE
Report:  1Q27I STOCKINV 00017 * C 00005000
         1Q27I BILLING 00019 * B 00001000
```

E Command (End/Cancel)

The E command terminates the POWER program, and frees the POWER partition and the POWER-supported partition. The POWER-supported partitions will have SYSIPT, SYSRDR, SYSLST, and SYSPCH unassigned. The following message appears on SYSLOG for each supported partition that has been active under POWER:

```
1C10A PLEASE ASSGN SYSRDR
```

If no further activities are planned for such partitions, they may be stopped by means of the DOS/VS command STOP.

Format

```
E  [KILL]
```

no operand — Terminates the POWER program, frees the POWER partition for another program, and restores the system to normal DOS/VS operation. POWER-supported partitions continue until processing of their current job entries has completed. After completion, POWER issues the message

```
1Q42I POWER HAS BEEN TERMINATED
```

KILL — cancels the POWER program immediately and causes a dump to be produced if SYSLST is assigned in the POWER partition. All running partitions that are supported by POWER are canceled, too. The active POWER routines are stopped immediately. When the dump has been printed, POWER issues the message

```
1Q42I POWER HAS BEEN TERMINATED
```

Note: If a partition supported by POWER was stopped during POWER execution, it must be activated by means of the BATCH command before issuing the E command to ensure that the last job entry in the partition is terminated.

F Command (Flush)

The F command terminates processing of the job entry output for a specified writer routine and deletes the job entry output from the output queue.

Format

```
   ⎧queue[,uraddr]      ⎫
F  ⎨queue,[uraddr],ALL  ⎬
   ⎩uraddr[,ALL]        ⎭
```

queue Specifies the queue for which the writer routine was started in the xxyyy or yyy format, where

xx = BG, F4, F3, F2, or F1
yyy = PRT or PUN

If 'queue' is omitted, POWER terminates the job entry output for the writer routine that is active on the device specified by 'uraddr'.

uraddr Specifies the I/O address for which the routine was started in the cuu or X'cuu' format. 'uraddr' may be omitted only if the AUTOSTR generation option is specified.

ALL Specifies that, in addition, all output in the specified queue is to be deleted.

The F command permits the specified writer routine to remain active to process job entry output as it becomes available in the output queue.

POWER does not acknowledge the F command with a message. However, the specified device should momentarily stop printing or punching the current job entry.

Examples

```
F  BGPRT,00E
F  00E
F  F2PUN,00D,ALL
F  PRT,00E
F  X'00D',ALL
```

G Command (Go)

The G command reactivates a POWER routine which is waiting for an operator action.

Format

```
  ⎧queue[,uraddr]⎫
  ⎪uraddr        ⎪
G ⎨partition     ⎬
  ⎪RJE,lineaddr  ⎪
  ⎩              ⎭
```

queue Specifies the queue for which the reader or writer routine was started in the xxyyy or yyy format, where

xx = BG, F4, F3, F2, or F1
yyy = RDR, PRT, or PUN

A queue specification in the yyy format indicates a partition-independent routine.

If 'queue' is omitted, POWER reactivates the routine that is on the device specified by 'uraddr'.

uraddr Specifies the address of the I/O device for which the routine was started in the cuu or X'cuu' format. 'uraddr' may be omitted only if the AUTOSTR generation option is specified.

partition Specifies the partition in which execution was temporarily halted.

RJE Specifies that the command is directed to an RJE routine.

lineaddr Specifies the line for which the RJE routine was started in the cuu or X'cuu' format.

POWER does not acknowledge the G command with a message. However, reactivating a reader or writer routine causes the specified device to resume operation.

Examples

1. Reactivate Reader or Writer Routine

```
G  BGPRT,00E

G  PRT,00E     (partition-independent
                routine)
G  F2PUN,00D
G  X'00E'
```

2. Reactivate POWER-Supported Partition

```
G  BG
G  F2
```

3. Reactivate RJE Routine

```
G  RJE,022
```

H Command (Hold)

The H command places the specified job entry in the hold state. It prevents processing of one or all job entries in the specified queue. Job entries may be removed from the hold state only by the R command.

Format

```
H  queue  { ,name[,number] }
          { [,ALL]         }
          { ,priority      }
```

queue — Specifies the queue to which the H command is directed, in the xxyyy format, where

xx = BG, F4, F3, F2, or F1
yyy = RDR, PRT, or PUN

name — Specifies the name of the job entry. 'name' may be from one to eight alphameric characters.

number — Specifies the number assigned to the job entry when it is entered in the input queue. Use the D command to obtain the job number. 'number' may be from one to five numeric characters; it allows addressing of specific job entries with identical names.

ALL — Specifies that all job entries in the specified queue are to be placed in the hold state.

priority — Specifies that all job entries in the specified queue with the specified priority are to be placed in the hold state. Priority is specified by Pn, where n is a numeric character from 0 through 9. Nine is the highest priority.

Examples

```
H  BGRDR,ASSEMBLY,2
H  BGPUN,P3            (priority option)
H  F2RDR,ALL
H  F2PRT,TEST
```

I Command (Inquire)

The I command provides the central installation operator with status information on a specific RJE routine or on all RJE routines. POWER responds with a report which includes, for each specified routine, the routine designation, termid, userid, and status. The status is one of the following: processing, active, inactive, not attached, not initiated, not supported (that is, no RJE block is associated with the specific line). The items included in the report are shown in Figure 17.

I Command Specification	Terminal State						Report Item Included		
	Not Attached	Not Supported	Not Initiated	Inactive	Active	Processing	'lineaddr'	'termid'	'userid'
'lineaddr'		X					X	N	N
			X				X	N	N
				X			X	N	N
					X		X	X	N
						X	X	X	X
'termid'	X						N	X	N
					X		X	X	N
						X	X	X	X
'userid'	X						N	N	X
						X	X	X	X

X = item is included in the report.
N = item is specified in the report as "NONE".

The ALL option of the I command creates a report for each RJE Block Name List Entry in accordance with the 'line addr' specification above.

Figure 17. Terminal States in Response to I Command

Format

```
        ( U,userid   )
        ( T,termid   )
I       ( L,lineaddr )
        ( ALL        )
```

U,userid — Specifies a valid 'userid' as defined during POWER generation. 'userid' may be from one to eight alphameric characters.

T,termid — Specifies a valid 'termid' as defined during POWER generation. 'termid' may be from one to eight alphameric characters.

L,lineaddr — Specifies the line for which an RJE routine is or may be started in the cuu or X'cuu' format.

ALL — Specifies that a status report is required for all RJE routines.

Examples

```
I  U,SMITH
I  T,NEWYORK
I  L,030
I  ALL
```

J Command (Job Accounting)

The J command causes processing of the POWER accounting file. It is accepted only if ACCOUNT=YES was specified as a POWER generation option.

The J command allows you to retrieve the accumulated account file records. POWER informs you when the account file is full by issuing a message on SYSLOG. You must then use the J command to empty the account file.

You may use the J command to punch the account file to cards, to write the account file to tape, or to delete the account file records. The file is then reusable from its beginning. The format of an ACCTFIL record is shown in Figure 18. The account file may be processed at any time while POWER is active.

Field	Pos. in Bytes	Data	Format
1	1-8	Name for the job entry	alphameric
2	9-10	Number of the job entry	binary
3	11	Number of print copies	binary
4	12	Number of punch copies	binary
5	13-16	Print forms identification	alphameric
6	17-20	Punch forms identification	alphameric
7	21-28	Date of execution (mm/dd/yy or dd/mm/yy depending on DOS/VS supervisor generation option)	alphameric
8	29-32	Read time	binary
9	33-36	Print time* Seconds x 300	binary
10	37-40	Punch time*	binary
11	41-44	Execution time**	binary
12	45-48	Number of cards read	binary
13	49-52	Number of lines printed per copy	binary
14	53-56	Number of cards punched per copy	binary
15	57-58	Indicates execution partition (BG, F1, F2, F3, or F4	alphameric
16	59	Number of track groups for input storage	binary
	60	Number of track groups for printed output	binary
	61	Number of track groups for punched output	binary
17	62	Printed output priority number	alphameric
18	63	Punched output priority number	alphameric
19	64	Printed output class	alphameric
20	65	Punched output class	alphameric
	66-80	Reserved	

* Not provided for a tape writer.

** If short jobs are executed, POWER overhead required for queue handling may cause POWER job accounting times of up to 30% higher than those computed by DOS/VS.

Figure 18. Format of an ACCTFIL Record

Format

```
J  {punchaddr}
   {tapeaddr }
   {DEL      }
```

punchaddr — Specifies the address of the punch that is to punch device the accounting records. It may be specified as cuu or X'cuu'.

tapeaddr — Specifies the address of the tape device for the accounting records. It may be specified as cuu or X'cuu'.

When processing is completed, a tape mark is written and the tape will be rewound and unloaded.

DEL — Specifies that the accounting file records are to be deleted.

Examples

```
J  00D     punch accounting file
J  180     write the accounting file to
           tape
J  DEL     delete the accounting file
```

L Command (Delete)

The L command deletes a job entry from the specified queue. Job entries being processed are not affected by this command. If there are no job entries in the specified queue, the message

```
1Q06I QUEUE IS EMPTY
```

appears on SYSLOG.

Format

```
L queue,  {name[,number]}
          {ALL          }
```

queue — Specifies the queue to which the L command is directed in the xxyyy format, where

xx = BG, F4, F3, F2, or F1
yyy = RDR, PRT, or PUN

name — Specifies the name of the job entry. It may contain from one to eight alphameric characters.

number — Specifies the number assigned to the job entry by POWER when the job entry is in the input queue. Use the D command to obtain the number of the job entry. 'number' may be from one to five numeric characters; it allows addressing of specific job entries with identical names.

ALL — specifies that all job entries in the specified queue are to be deleted.

Examples

```
L  BGPRT,RUN1,3
L  F2RDR,ALL
```

M Command (Multiple Copy)

The M command displays or alters the copy counter for the job entry output currently being processed by the specified output writer routine.

The display option is used to determine the number of copies left to be processed, including the one in progress.

The alter option adds the specified value to the current copy counter. It is not possible to decrease the copy counter, but you may terminate processing of the job entry's output with the F command. The copy counter cannot be higher than 255.

Format

1. Display copy counter:

```
M {queue[,uraddr]}
  {uraddr         }
```

2. Alter copy counter:

```
M {queue,[uraddr],additional}
  {uraddr,additional        }
```

queue — Specifies the queue for which the writer routine was started in the xxyyy or yyy format, where

xx = BG, F4, F3, F2, or F1
yyy = PUN, or PRT

A queue specification in the yyy format indicates a partition-independent routine. If 'queue' is omitted, POWER alters/displays the copy counter for the job entry output being processed on the device specified by 'uraddr'.

uraddr specifies the address of the I/O device for which the writer routine was started in the cuu or X'cuu'format. 'uraddr' may be omitted only if the AUTOSTR generation option is specified.

additional
specifies the number of additional copies to be made. It is entered in the form of one or two numeric characters.

If you have used the display option and wish to increase the copy counter, make sure that you have enough time to complete the alter option for example, by making the device being used not ready. Otherwise, the alter option will be applied to the next job entry.

Examples

1. Display copy counter:

```
M  BGPRT,00E
M  F2PUN,00D
M  PRT,00E
M  X'00D'
```

2. Alter copy counter:

```
M  BGPRT,00E,12
M  F2PUN,00D,03
M  00E,21
```

O Command (Output)

The O command allows the central installation operator to change the output destination of an RJE job entry.

Format

```
O name ,[number], [userid          ]
                  [ALLURSERS       ]
                  [LOCAL[,queue]   ]
```

name Specifies the name of the job entry. It may be from one to eight alphameric characters.

number Specifies the number assigned to the job entry by POWER when the job entry is logged in the input queue. Use the D command to obtain the number of the job entry. 'number' may be from one to five numeric characters; it allows addressing of specific job entries with identical names.

userid
ALLUSERS
LOCAL specify the destination of the output. 'userid' is valid if it is contained in the Userid List, which is created when POWER is generated. 'ALLUSERS' specifies that output will be available to all users on a read-only basis. Only the central installation operator may delete job entries with the 'ALLUSERS' destination.

LOCAL specifies that the output will be directed to the local output queues.

queue specifies the queue to which the local output is to be directed in the yyy format. It allows separate handling of print and punch output.

YYY = PRT or PUN

If queue is not specified, all output is directed to both the local print and punch queues.

Examples

```
O  BGJCB1
O  BGJCB2,2,ALLUSERS
O  BGJCB3,,LOCAL
O  BGJCB4,,LOCAL,PRT
```

P Command (Stop)

The P command stops a reader, writer, or RJE routine. It can also be used to stop and checkpoint a punch writer routine for a 2560 MFCM or 5425 MFCU.

Format

```
                 (queue,[uraddr],[EOJ       ])
                 (              [CHECKPOINT])
P                (icaddr [,EOJ       ]      )
                 (       [,CHECKPOINT]      )
                 (RJE,lineaddr               )
```

queue Specifies the queue for which the reader or writer was started in the xxyyy or yyy format, where

xx = BG, F4, F3, F2, or F1
yyy = RDR, PRT, or PUN

A queue specification in the yyy format indicates a partition- independent routine. If 'queue' is omitted, POWER stops the reader/writer routine that is active on the device specified by 'ioaddr'.

ioaddr — Specifies the address of the I/O device for which the routine was started in the cuu or X'cuu' format. 'ioaddr' may be omitted only if the AUTOSTR generation option is specified.

If the reader routine was started to a card reader and a 3540, specify the card device for cuu.

EOJ — Causes the punch routine to stop at the end of the job entry.

If EOJ is omitted, the indicated routine stops after the current DATAFIL record has been processed.

CHECKPOINT — Specifies that a punch routine for the 2560 or the 5425 is to be checkpointed and stopped in order to start another POWER routine for the same unit. After this other routine has terminated, punching of the interrupted job entry can be resumed from the checkpoint with the RESTART option of the S command.

RJE — Specifies that the command is directed to an RJE routine.

lineaddr — Specifies the line for which the RJE routine was started in the cuu or X'cuu' format.

If an RJE or reader routine was preparing a job entry in the input queue when the P command was entered, input processing is terminated immediately. The job entry being read in must be reentered.

If you stop a reader routine using a 5425, press the ENPRO key to clear the card path before starting another routine to this device. Otherwise, results with the next routine will be unpredictable.

If an RJE or output routine was punching or printing output, the P command causes termination of output processing. The output is not deleted from the output queue and will be printed or punched when the routine is started again.

Unless an emergency exists, you should use the I command to determine the status of the remote terminal before you stop an RJE routine:

POWER acknowledges the P command with a message.

The message for a stopped reader/writer routine is

```
1Q77I STOPPED xxycuu
```

where y = R for a reader routine
T for a print routine, or
P for a punch routine

The message for a stopped RJE routine is

```
1R29I devicetype ROUTINE HAS BEEN
      TERMINATED RJE cuu
```

where device type = {2770,2780,3780}
line address = cuu

Examples

```
P  BGRDR,00C
P  F2PUN,00D,EOJ
P  PUN,00D,CHECKPOINT
P  F2PRT,00E
P  PRT,00E
P  00E
P  00E,EOJ
P  RJE,031
```

R Command (Release)

The R command releases a job entry from the hold state in the specified queue. If there are no job entries in the queue, POWER issues the following message on SYSLOG.

```
1Q06I QUEUE IS EMPTY
```

Format

```
R  queue  {,name[,number]}
          {[,ALL]       }
          {,priority    }
```

queue — Specifies the queue to which the R command is directed in the xxyyy format, where

xx = BG, F4, F3, F2, or F1
yyy = RDR, PRT, or PUN

name — Specifies the name of the job entry. It may contain from one to eight alphameric characters.

number — Specifies the number assigned to the job entry by POWER when the job entry is logged in the input queue. Use the D command to obtain the number of the job entry. 'number' may be from one to five numeric characters; it allows addressing of specific job entries with identical names.

ALL Specifies that all job entries in the specified queue are to be released from the hold state.

priority Specifies that all job entries in the specified queue with the specified priority are to be removed from the hold state. Priority is specified by Pn, where n is a numeric character from 0 to 9. Nine is the highest priority. This operand is not valid if PRIORTY=NO was specified during POWER generation.

Examples

```
R  BGPRT,ASSEMBLY,26
R  F2PRT,ALL
R  BGPUN,P3            (priority option)
```

S Command (Start)

The S command starts a reader, writer, or RJE routine.

Format

```
        queue,[ioaddr],[buffers],{tapeaddr}
                                 {class   }
        queue,[ioaddr],[buffers],[RESTART]
S       queue,[duaddr],[buffers],['filename'],
              [vols],[S]
        queue,craddr,[buffers],duaddr
        RJE,lineaddr[,type]
        RJE,lineaddr,type[,2540,cuu]
```

queue Specifies the queue of the routine in the xxyyy or yyy format, where

xx = BG, F4, F3, F2, or F1
yyy = RDR, PRT, or PUN

A queue specification in the yyy format indicates a partition-independent routine.

uraddr Specifies the I/O device for which the routine is to be started in the cuu or X'cuu' format. 'uraddr' may be omitted only if the AUTOSTR generation option is specified.

buffers Specifies the number of I/O buffers to be assigned to a routine. For a reader or print routine, 'buffers' is specified as 1 or 2.

For diskette input, the reader routine will attempt to get sufficient buffer space to hold all records from one diskette track, regardless of the number of buffers specified.

For punch routines, buffers may be specified as two numeric characters. The first character specifies the number of buffers (1 or 2) to be assigned to the routine. The second character specifies a pause code (0, 1, or 2).

Specifying 0 indicates that the forms number given in the * $$ PUN statement is not to be printed out on SYSLOG, and the routine is not to pause between job entries.

Specifying 1 indicates that each form number should be printed on SYSLOG and that the routine should pause before processing each job entry.

Specifying 2 indicates that every other form number should be printed and that the routine should pause before processing every other job entry.

If the second character is omitted, zero is assumed.

tapeaddr Specifies the address of the tape drive that contains print or punch images. It is entered in the cuu or X'cuu' format.

This parameter is necessary if output spooled on tape by POWER is to be printed or punched by this routine.

Before a routine can be started to use a given device, any other routine using that device must be stopped or canceled.

Note: Tape must be positioned correctly before starting a tape writer.

class Specifies the class with which the writer routine is to be associated. Up to four classes may be specified in the form of an alphabetic character string.

Note: The class parameter does not apply to a tape writer.

RESTART Specifies that the punch routine is to resume processing at the point where it was interrupted by a P command with the CHECKPOINT option (for IBM 2560 MFCM and 5425 MFCU only). An example of checkpointing and restarting a routine using the IBM 2560 and 5425 is given in DOS/VS Operating Procedures, GC33-5378.

'filename'
Is the name of the diskette file to be read; it must be identical to the filename in the HDR1 label on the diskette. One to eight alphameric characters, including blanks, may be entered between the quotes. If this parameter is omitted, POWER will read the first non-protected file found on the diskette currently mounted on the 3540.

vols Is the maximum number of diskette volumes to be read. Any number from 1 to 255 may be specified; the default value is 1. The reader routine terminates when that many diskettes have been read or when EOF is reached.

S Specifies that volume sequence checking is desired. If S is entered, the sequence number of the first volume must be 1, the number of the second volume must be 2, and so on.

craddr Specify the card reader (craddr)
duaddr and the diskette unit (duaddr) in the cuu or X'cuu' format if both devices are used for input to the reader routine. In this case, filename, vols, and S are specified in the * $$ RDR statement.

If a reader routine is started to a 3540 diskette unit in the format

```
S  queue,duaddr,buffers
     [,'filename'][,vols][,S]
```

the specified file must consist of job entries in the form of 80 or 81 character records. These records are stored as 80 character card images on the POWER DATAFIL (the first character of 81 character records is removed). POWER handles JECL and JCL card images from the 3540 file as it does those from a card reader. During execution the card images from the diskette file are handled as card input from the SYSIN card device.

RJE Specifies that the command was given to start an RJE routine.

lineaddr Specifies the line for which the RJE routine is to be started in the cuu or X'cuu' format.

type Specifies the work station device type. 'type' may be specified as one of the following:

2770	2770,128
2780	2770,256
3780	2770,512

The record number after 2770 indicates the buffer size of the terminal.

2540,cuu Specifies together with the operands RJE, lineaddr and type that an RJE simulator routine is to be started.

Examples

```
S  BGRDR,X'00C'
S  BGPRT,00E,2
S  F2PUN,00D,20
S  RDR,00C          (partition-independent
                     routine)
S  BGPRT,00E,,285   (tape writer routine)
S  PRT,00E,,ABCD    (partition-independent
                     routine of classes
                     A-D)
S  RJE,020
S  RJE,030,2770
S  RJE,035,2780
```

If you are using a 2560 MFCM or 5425 MFCU, you need not wait for the completion of the current punch job in order to start another routine, for example, a reader routine. You can interrupt the punch job by specifying CHECKPOINT in the P command, start the reader routine, and - upon completion of the reader job - restart the punch job by means of the RESTART operand of the S command.

Assume that you are using a 5425 MFCU at address '00C' and that you must stop a punch job named LARGE to read in more input to the background partition. Enter the following command:

```
P 00C,CHECKPOINT
```

A checkpoint is taken, the punch job is stopped, and the following messages are issued:

```
1Q66I BG LARGE 00027 HAS BEEN CHECKPOINTED
1Q77I STOPPED BGP00C
```

You can now start the reader routine by entering

```
S BGRDR,00C
```

After the reader routine has completed reading the new input, you can restart the interrupted punch job by entering

```
S PUN,00C,,RESTART
```

This will cause the message

```
1Q68I BG LARGE 00027 HAS BEEN RESTARTED
```

to be issued, and the punch routine resumes where it left off when the punch job was interrupted.

T Command (Restart)

The T command restarts the printed output of a job entry from the beginning or from a specified page.

Format

```
T { writer[,uraddr]          }
  { writer,[uraddr],count    }
  { uraddr[,count]           }
```

writer — Is specified in the xxPRT or PRT format, where

xx = BG, F4, F3, F2, or F1

A specification of PRT (without the partition identifier) indicates a partition-independent writer routine.

If 'writer' is omitted, POWER restarts the job entry output processed on the device specified by 'uraddr'.

uraddr — Specifies the I/O device for which the print writer routine was started in the cuu or X'cuu' format. 'uraddr' may be omitted only if the AUTOSTR generation option is specified.

count — Is specified as a signed or unsigned value from 0 to 999. A plus sign indicates pages forward, a minus sign indicates pages backward from the interrupted page. No sign indicates a specified page count from the beginning. If the operand is omitted, printing resumes from the first page.

If the page count with a minus sign is higher than the number of printed pages, printing also resumes from the first page.

POWER does not acknowledge the T command with a message. However, the device with which the routine is associated will continue with the output after positioning to the new page.

Page numbering is based on the count of the 'skip to channel 1' commands and not on the actual headline numbers.

Examples

```
T  BGPRT,00E     restart from the beginning
T  F2PRT,00F,10  restart from page 10
T  00E,+100      restart 100 pages past the
                 last page previously
                 printed
```

Z Command (Trace)

The diagnostic trace command Z conditionally monitors TIB (task information block) contents, QFILE record format and contents, and DATAFIL records. These aids are generated as a user option with DIAG=YES. The trace information is stored in a POWER wrap-around buffer. To access the information, obtain a POWER dump, for instance, the dump produced by the KILL command. Look up the constant 'LOGADDR=' in the dump. The wrap-around buffer starts immediately after the constant. The first four bytes of the buffer contain the address of the last entry which was written into the buffer.

Format

1. DUMP option:

```
                 { TIB[,QFL][,DFL] }
                 { QFL[,DFL][,TIB] }
Z  DUMP,         { DFL[,TIB][,QFL] }
                 { END             }
                 { LST             }
```

2. TRACE option:

```
                 { SVC             }
Z  TRACE         { TSK[,SVC]       }
                 { END             }
                 { LST             }
```

TIB — Specifies that the contents of the TIB are to be written in the wrap-around buffer.

QFL — Specifies that all write operations to QFILE are to be written in the wrap-around buffer.

DFL — Specifies that all write operations to DATAFIL are to be written in the wrap-around buffer.

SVC Specifies that any active trace is terminated, and an SVC 0 trace is started. The information is collected in the wrap-around buffer. One four-byte entry is made for each SVC 0. The first byte contains the SVC code (always 0) and the last three bytes contain the SVC address.

TSK Specifies that any active trace is terminated, and routine selection trace is started. All routines are traced except 'NO WORK', 'QFILE', and 'DATAFIL' routines. The information is collected in the wrap-around buffer in eight-byte entries. The first three bytes of the entry contain the ID of the routine or the RJE line number, the fourth byte contains the TIB action code, the fifth byte the TIB status code, and the last three bytes contain the TIB address. If TSK and SVC are specified, both traces are active in the wrap-around buffer.

LST Specifies that the current status of the diagnostic operation is to be listed on SYSLOG. This option does not change the status itself.

END Specifies that the diagnostic operations are to be terminated.

Examples

```
Z  DUMP,TIB,DFL
Z  DUMP,DFL,QFL
Z  DUMP,QFL,DFL,TIB
Z  DUMP,LST
Z  DUMP,END
Z  TRACE,SVC
Z  TRACE,TSK
Z  TRACE,SVC,TSK
Z  TRACE,LST
Z  TRACE,END
```

POWER RJE TERMINAL COMMANDS

Remote Job Entry (RJE) is an extension of POWER and allows you to submit job entries from remote locations via IBM 2770, 2780, or 3780 terminals for processing at a central installation under DOS/VS.

Communication between the central installation and the terminal is possible at all times via messages. Messages from the terminal to the central operator are immediately printed on SYSLOG. Messages from the central operator to the terminal are stored in a message queue and printed on the terminal printer only if requested by the terminal user by a terminal command.

FUNCTION OF POWER RJE TERMINAL COMMANDS

POWER RJE terminal commands are used to control job entries that are entered at a terminal for processing at a central installation. They may have four different functions:

1. Define the status of a terminal:

   RJSTART
   RJEND
   LOGON
   LOGOFF

2. Manipulate job entries and associated output:

   OUTPUT
   CONTINUE
   DELETE

3. Provide job entry and system information:

   STATUS
   BRDCSTR

4. Communicate with the central operator:

   MSGR

The RJSTART command is accepted only when the terminal is in the inactive state. The LOGON and RJEND commands are accepted when the terminal is in the active or in the processing state. All other terminal commands are accepted only when the terminal is in the processing state. (Terminal states are described in the manual DOS/VS System Management Guide, GC33-5371.)

FORMAT OF POWER RJE TERMINAL COMMANDS

POWER RJE terminal commands are entered as punched cards through the terminal reader. Each command must be completely contained in one punched card; continuation cards are not permitted. The format of POWER RJE commands is shown in Figure 19.

POWER RJE terminal commands must be placed either ahead of the first job entry made during a terminal session, or between job entries, or after the last job entry of a terminal session.

DESCRIPTION OF POWER RJE TERMINAL COMMANDS

Figure 20 lists all terminal commands and shows what they do. Following this list is a detailed description of each command, including a discussion of the operands. The commands are described in alphabetical order.

Col. 1-4	5	6-71			72	73-80
* ••	Blank	Operation Field (1)	Operand Field (2)	Comments Field (3)	Blank	Sequence Field (4)

* •• in columns 1 through 4 identify the card as terminal command.

(1) The operation field defines the operation to be performed. This field must be preceded by one or more blanks. The operation field is terminated by a blank.

(2) The operand field, if required, contains one or more parameters separated by commas. The operand field has no fixed length. A blank terminates the operand field; therefore, none of its parameters may contain blanks. The only exception is the operand of the MSGR command, where blanks may appear as part of the message text. If the command contains a comments field and the operand field is omitted, the omitted operand field is indicated by a comma preceded and followed by blanks.

(3) The comments field is optional. It may contain any desirable information and has no fixed length.

(4) The sequence field is optional and contains up to eight characters that may be used to identify the command. Sequence numbers are useful when a number of commands with the same operation code is submitted from one terminal. POWER RJE returns the sequence number in all responses to and diagnostics of terminal commands. This allows the terminal operator to correlate the commands he entered with the responses he received.

Figure 19. Format of POWER RJE Terminal Commands

Command	What it does
* .. BRDCSTR	Requests a copy of broadcast messages.
* .. CONTINUE	Specifies the disposition of interrupted output.
* .. DELETE	Removes job entry from the specified queue.
* .. LOGOFF	Ends a terminal session started by * .. LOGON.
* .. LOGON	Begins a terminal session for remote job entry under POWER RJE.
* .. MSGR	Sends a message to the central operator.
* .. OUTPUT	Requests the output of processed job entries.
* .. RJEND	Detaches a terminal from POWER RJE at the central installation.
* .. RJSTART	Attaches a terminal to POWER RJE at the central installation.
* .. STATUS	Obtains a status report on one or more RJE job entries in the specified queue.

Figure 20. POWER RJE Terminal Commands and What They Do

BRDCSTR Command

Broadcast messages are entered into the POWER message queue by the central operator, by means of a B (broadcast) command.

The BRDCSTR command enables the terminal operator to obtain a copy of broadcast messages for his terminal. POWER RJE responds to this command by returning a copy of the system broadcast messages to the terminal. These messages contain information of general interest to all RJE users or to specific users. They are retrieved only on request from a terminal.

Messages for a specified user are deleted after a copy has been printed at the terminal.

Format

* .. BRDCSTR (no operand)

CONTINUE Command

Output may be interrupted when operator intervention at the terminal is required because, for example, forms on the terminal printer must be changed. The interrupted output is held until the appropriate CONTINUE command is transmitted.

Interruptions that require a CONTINUE command to be submitted cause a message to this effect to be printed. Then a card is read. If it is not a CONTINUE card, the input stream is flushed in preparation for the transmission of the CONTINUE command, and a message is written to the terminal printer stating that the job stream was flushed. If the CONTINUE command is not transmitted within 28 seconds, a time-out will occur.

Following a time-out, the system reissues the read request until the generated RETRY count is exhausted, at which time the work station is detached from the RJE system. If the terminal is detached, the interrupted output is saved, and the terminal operator may or may not receive the appropriate ending message, depending upon the component interrupted.

To reinstate his user session, the terminal operator must resubmit an RJSTART command and a LOGON command. The interrupted output must be requested via an OUTPUT command. The output is then transmitted from the beginning, but the terminal operator can skip printed output to any subsequent page by interrupting the output and submitting an appropriate CONTINUE command.

The CONTINUE command provides six options:

1. Transmit the output, starting with the block of records being written when the output was interrupted (the command does not require an operand).
2. Transmit the interrupted output from the beginning.
3. Delete the output.
4. Hold the output until it is requested by an OUTPUT command.
5. Change the destination of output to a local output writer.
6. Page forward or backward from the interrupted page or from the beginning of the printed output.

Format

```
* .. CONTINUE [BEGIN       ]
              [NO          ]
              [HOLD        ]
              [LOCAL       ]
              [PAGE[,count]]
```

no operand
: Specifies that transmission of data is to be resumed with the output data block that was being transmitted when the output was discontinued.

BEGIN
: Specifies that the terminal operator desires transmission of the job entry's output from the beginning.

NO
: Indicates that the terminal operator desires the deletion of the job entry's output.

HOLD
: Specifies that the job entry's output is to be placed in the hold state and will be requested via an OUTPUT command at some later time. This option has particular significance when a change of forms is required and the forms are not immediately available.

LOCAL
: Changes the destination of job entry's output to a local output writer.

PAGE
: Allows the terminal operator to page forward or backward up to 999 pages from the interrupted page or forward up to 999 pages from the beginning of the job entry's printed output.

count
: Is specified as a signed or unsigned value of from 0 to 999. A plus (+) sign indicates page forward, minus (-) sign indicates page backward from the interrupted page. No sign indicates a specified page count from the beginning. If the operand is omitted, printing is resumed from the interrupted page. A page count beyond the limits of the job being printed causes the following:

  a. If the user specifies too large a backward page count, printing starts from the beginning.

b. If the user specifies a forward page count that goes beyond the last page, a message is printed informing him of the maximum number of pages in the job entry and requesting another CONTINUE card.

Note to 2770 and 3780 terminal users

A data buffer is being filled while data is being printed. If printing of output is interrupted after the second data buffer has been filled but before the first data buffer completes printing, a no-operand specification may result in lost data. It is therefore recommended that the PAGE option be specified.

Note to 2780 terminal users

From two to seven records will be printed with each BTAM write operation if your terminal is equipped with the multi-record-transmission feature. Specifying no operand may result in duplication of one or more records if the interruption occurred before the write (or punch) operation of the last block had been completed.

DELETE Command

The terminal operator can use the DELETE command to cause either of the following:

- Delete a specific job entry previously submitted by him.
- Delete all job entries previously submitted by him.

The DELETE command does not remove named data files created by the job entry specified for deletion. The command is not necessary to remove output which has already been returned to the terminal user. All references to a job entry processed by POWER RJE are removed after the output is returned to the user.

Format

```
* .. DELETE  queue, {name[,number]}
                    {ALL          }
```

queue Specifies the queue to which the DELETE command is directed in the xxyyy format, where

xx = partition to which the job entry was assigned for execution: BG, F4, F3, F2, or F1

yyy = RDR for reader
PRT for printer
PUN for punch

name Specifies the name by which the job entry is known to POWER. The specified name may be from one to eight alphameric characters long. Each job entry name is qualified by a number assigned to it by POWER. Therefore, if the possibility of duplicate job entry names exists, that number should be specified also. If a duplicate name exists and the number is not specified, the first job entry found with the specified name is deleted.

number Specifies the 1 to 5-digit number assigned to the job entry by POWER RJE.

The terminal operator may use the STATUS command to inform himself about the correct specification for 'number'.

ALL Requests to delete all job entries in the specified queue that were submitted under the 'userid' specified in the LOGON command for the current session.

LOGOFF Command

The LOGOFF command indicates that the terminal user currently logged on has completed his session. After receiving a LOGOFF command, POWER RJE refuses job entries from the terminal until another LOGON command is submitted.

Output to be returned to the current terminal user can be returned only during a session that was started with his userid in the LOGON command. Whenever a terminal user ends a session, a message appears on the central operator's console, identifying the user and indicating the time he logged off.

Format

```
* .. LOGOFF   (no operand)
```

If the central system receives a valid LOGON command from a terminal with a session in progress, the central system logs off the current user and logs on the user identified in that LOGON command. If the central system receives an RJEND command from a terminal with a session in progress, it logs off the user and logically detaches the terminal. In other words, the terminal operator may omit the LOGOFF command when changing user sessions or detaching the terminal.

LOGON Command

Following an RJSTART command, a user at a terminal which is logically attached to POWER RJE issues a LOGON command to start his session. The command identifies the user to POWER RJE and allows him access to the system. By checking the 'userid' in the LOGON command, POWER RJE guarantees that only authorized users can submit input or request output from the system. The LOGON command remains in effect until another LOGON, a LOGOFF, or an RJEND command is entered by the terminal operator.

A terminal user who has more than one terminal available may log on at two terminals at one time to permit the use of one line for input and another for output, two lines for output, or two lines for input.

Format

```
* .. LOGON  userid
```

userid Specifies the name assigned to the terminal user by the installation. If the 'userid' specified in this parameter is not valid, POWER RJE rejects the command and a corrected statement must be submitted. The 'userid' may consist of up to eight alphameric characters. Whenever a terminal user begins a session, a message appears on the central operator's console identifying the user and indicating the time the terminal operator logged on.

MSGR Command

Messages sent to the central operator by means of the MSGR command are displayed on SYSLOG when they are received.

Format

```
* .. MSGR M,'text'
```

M,'text' Specifies the message text to be sent. The message text must be enclosed in single quotation marks. The text itself may include up to 40 printable characters and blanks. Continuation lines are not permitted. Any messages requiring more than 40 characters of text must be sent by multiple commands. Quotation marks contained within the message text must be doubled, and each quotation mark counts as one text character.

OUTPUT Command

The OUTPUT command can be used to request the output of job entries whose output destination is either the terminal operator's 'userid' or 'ALLUSERS'.

A job entry's output destination can be specified:

1. explicitly in the * $$ JOB statement,
2. implicitly, if, in the * $$ JOB statement for a remotely submitted job entry, no 'termid' or 'userid' was specified (in this case, POWER RJE assumes that the job entry's output is to be made available only on the terminal user who was logged on when the entry was submitted), or
3. explicitly by means of an O (output) command issued by the central operator.

If processing of a particular job entry has not finished when the output is requested, the job entry is not in the output queues and POWER RJE returns a message indicating that the job entry was not found. The OUTPUT command must be resubmitted after processing of the job entry has finished. The OUTPUT command provides the following options:

- The terminal operator may request the output of a specific job entry if that job entry's output destination is either the requesting operator's 'userid' or 'ALLUSERS'.
- The terminal operator may request all output whose destination is identical with the requesting operator's 'userid'.
- The terminal operator may request the output whose destination is 'ALLUSERS'.

Format

```
* .. OUTPUT {name[,number]}
            {ALL          }
            {ALLUSERS     }
```

name Indicates that the request is for the output of the job entry named in the parameter.

number Specifies the number assigned to the job entry by POWER RJE when the job entry was logged in the input queue. The terminal operator may use the STATUS command to obtain the correct specification for 'number'. 'number', which may be specified as a decimal number of one to five digits, is needed only if job entries with identical names were submitted.

ALL Specifies that POWER RJE is to return to the terminal operator all the available output destined for him in accordance with his 'userid'.

ALLUSERS Specifies that POWER RJE is to return to the terminal operator all the output available on a read-only basis with destination 'ALLUSERS'.

If the terminal operator is not an authorized recipient of the requested output, POWER RJE returns either of the following messages:

1R66I JOB ENTRY name NOT FOUND (if 'name' was specified)

1R69I NO OUTPUT WAITING (if 'ALL' or 'ALLUSERS' was specified)

The same messages are returned to the terminal operator if he requests output of a job entry that was not entered previously.

A user is automatically a valid recipient of a job entry's output if he submits the job entry, unless the destination field in the * $$ JOB statement specified another 'userid'. Job entries with the destination 'ALLUSERS' will not be purged when the output function has completed.

No OUTPUT command is needed to retrieve a job entry's output if the entry is completely processed and

- the user who submitted the job entry is still logged on
- that output was neither placed into the hold state nor directed to another terminal user, and
- the transmission of another job entry finishes.

RJEND Command

The RJEND command allows a terminal user to logically detach his terminal from POWER RJE.

Format

```
* .. RJEND   (no operand)
```

No output of the job entry is returned to the terminal after the RJEND command has been received. POWER RJE transmits the message

IR71I RJEND PROCESSED

in response to the RJEND command.

If the terminal is connected to the central system via a switched connection, the connection is broken. To ensure successful termination, the operator should not disconnect his terminal before he has received the message indicating that the RJEND command was accepted. No further communication occurs until the terminal resumes RJE activity with an RJSTART command.

RJSTART Command

The RJSTART command logically attaches a terminal to POWER RJE, that is, it indicates to POWER RJE that remote job entry is intended from the specified terminal.

The RJSTART command must be the first statement received from an inactive (logically not attached) terminal. In addition to identifying the terminal to POWER RJE, this command allows the terminal operator to request broadcast messages before continuing RJE processing. Communication proceeds between the central system and the terminal after a valid RJSTART command has been received. Once the terminal is logically attached, a terminal operator may gain access to the central system by logging on at the terminal with the LOGON command.

Format

```
* .. RJSTART   termid[,BRDCST],[termtype],
                [bufsize],[NOPUNCH]
```

termid specifies the name of the terminal. The specified name must be contained in POWER RJE's list of authorized user identifications. The name may consist of from one to eight alphameric characters. If the specified 'termid' is not

recognized as a valid name, POWER RJE rejects the command, and a corrected statement must be submitted.

BRDCST specifies that a copy of the broadcast messages for the specified 'termid' is desired before RJE operation is continued. Messages for the specified 'termid' are deleted after a copy has been printed at the terminal. If this parameter is omitted, no messages are broadcast at this time.

termtype Specifies the device type, which may be 2770, 2780, or 3780. Default is the device generated into the RJEBLK macro (see note below).

bufsize Specifies the size of the buffer for 2770 terminals. The values may be 128, 256, or 512. For other terminal types, the parameter is omitted. Default for the 2770 is 128. (See note below.)

NOPUNCH Specifies to the system that the terminal has no punch.

The RESTART card must have at least two consecutive blanks somewhere within the first 80 columns for space/compress/expand recognition by POWER.

Note: The parameters termtype and bufsize can be used to override the parameters DEVICE and BUFSIZE in the POWER generation macro RJEBLK. If different terminal types are used with the same central installation, termtype and bufsize should always be specified.

If the terminal operator desires to resume RJE activity after the terminal has been logically detached from the system (after an RJEND command or a system failure), he must resubmit the RJSTART command.

Only the LOGON command or the RJEND command may follow the RJSTART command.

STATUS Command

RJE returns the status of only those job entries which are currently in the specified queue and which have the terminal operator's userid or ALLUSERS specified as output destination. The STATUS command provides the following options:

- The terminal operator can request the status of a specific job entry.
- The terminal operator can request the status of all job entries which are in the specified queue and for whose output he is an authorized recipient.

In response, POWER RJE transmits the following:

- Name of job entry and number
- Priority
- Number of logical records associated with the job entry in the specified queue
- Disposition of the job entry in the RDR, PRT, and PUN queues as specified by the JECL statements for the entry.

If POWER RJE is unable to provide the above information in response to a STATUS command, it transmits either of the following messages:

1R66I JOB ENTRY name NOT FOUND (if 'name' was specified)

1R76I queuename QUEUE IS EMPTY (if 'ALL' was specified)

POWER RJE immediately returns the status of only those job entries which satisfy a STATUS command at the time the command is received. POWER RJE does not automatically return the new status of a job entry when a change of status occurs.

Format

```
* .. STATUS queue [,name[,number]]
                  [,HOLD          ]
                  [,priority      ]
                  [,ALLUSERS      ]
                  [,ALL           ]
```

queue Specifies the queue to which the display command is directed in the xxyyy format, where

xx = partition to which the job entry was assigned for execution: BG, F4, F3, F2, or F1

yyy = RDR for reader
PRT for printer
PUN for punch

name Specifies the name of the job entry about which status information is required. Each job entry name is qualified by a number assigned to it by POWER RJE. Therefore, if duplicate job entry names occur, number should be specified also.

number — Specifies the number assigned to the job entry by POWER RJE when the job entry was logged in the input queue. This (1 to 5-digit) number is also used with output queue entries for this job entry.

HOLD — Indicates that status information is requested only for those job entries which satisfy the command and are in the hold state.

priority — Indicates that status information is requested only for those job entries which were assigned the same priority number. Priority is specified in the form Pn, where n = any number from 0 to 9. Nine is the highest priority.

ALLUSERS — Indicates that status information is requested for those job entries in the queue whose output destination is 'ALLUSERS'.

ALL — Indicates that status information is requested for all job entries in the queue which the current terminal operator is authorized to receive.

EXAMPLES OF POWER RJE TERMINAL COMMANDS

The following examples illustrate the usage of POWER RJE terminal commands.

Example 1 - Initiate Terminal Operation and User Session

STMNT 1 in Figure 21 logically attaches the terminal to the RJE system and requests broadcast messages for Seattle, and STMNT 9 logically detaches the terminal. Between STMNT 1 and STMNT 9, three user sessions take place. District 3 has two sessions: The first begins with STMNT 2 and ends with STMNT 4, and the second begins with STMNT 6 and ends with STMNT 8. In the first session, District 3 submits job entries for processing and requests verification that the job entries have been successfully entered into the POWER system. In the second session, District 3 requests all accumulated output which is to be returned to District 3. District 3A has only one session, which begins with STMNT 5 and ends with STMNT 6. Note that the LOGON command for District 3 terminates District 3A's session.

```
* ..          RJSTART          SEATTLE,BRDCST,3780      STMNT 1
* ..          LOGON DIST3                               STMNT 2
               .
               .
               Job Entries from District 3
               .
               .
* ..          STATUS BGRDR,ALL                          STMNT 3
* ..          LOGOFF                                    STMNT 4
* ..          LOGON DIST3A                              STMNT 5
               .
               .
               Job Entries from District 3A
               .
               .
* ..          LOGON DIST3                               STMNT 6
* ..          OUTPUT ALL                                STMNT 7
* ..          LOGOFF                                    STMNT 8
* ..          RJEND                                     STMNT 9
```

Figure 21. Example 1 - Initiate Terminal Operation and User Session

Example 2 - Use of BRDCSTR, MSGR, STATUS, OUTPUT, and DELETE Commands

Example 2 in Figure 22 assumes that Class 2 has previously submitted job entries for processing. The terminal is logically attached to the RJE system with STMNT 1 and logically detached with STMNT 17. Note that STMNT 17 also defines the end of Class 2's second session; no LOGOFF command is required. Class 2 has two user sessions: The first begins with STMNT 2 and ends with STMNT 7, and the second begins with STMNT 11 and ends with STMNT 17. During the first session, three general requests are made for status reports of job entries submitted for processing in the background partition. STMNT 6 requests any messages for Class 2. When these messages are transmitted, they are deleted from the message queue.

During the second session, selected job entries are deleted and output for one job entry is requested. The STATUS command is used again in STMNT 15 and STMNT 16 to verify the changes made to the BGRDR and BGPRT queues.

Class 6 has a user session beginning at STMNT 8 and ending at STMNT 11. Note that the user session was terminated with the LOGON command for Class 2; the LOGOFF command was not required. During the user session, Class 6 requested any broadcast messages for its 'userid', submitted job entries, and verified the results of job entry submission with the STATUS command.

```
|* ..          RJSTART COURSE1,BRDCST,2770,512,NOPUNCH    STMNT 1   |
|* ..          LOGON CLASS2                               STMNT 2   |
|* ..          STATUS BGRDR,ALL                           STMNT 3   |
|* ..          STATUS BGPRT,ALL                           STMNT 4   |
|* ..          STATUS BGPUN,ALL                           STMNT 5   |
|* ..          BRDCSTR                                    STMNT 6   |
|* ..          LOGOFF                                     STMNT 7   |
|* ..          LOGON CLASS6                               STMNT 8   |
|* ..          BRDCSTR                                    STMNT 9   |
|              .                                                    |
|              .                                                    |
|              Job Entries from Class 6                             |
|              .                                                    |
|              .                                                    |
|* ..          STATUS BGRDR,ALL                           STMNT 10  |
|* ..          LOGON CLASS2                               STMNT 11  |
|* ..          DELETE BGRDR,STUDENTI,6                    STMNT 12  |
|* ..          OUTPUT STUDENT9                            STMNT 13  |
|* ..          DELETE BGPUN,SAMPROB                       STMNT 14  |
|* ..          STATUS BGRDR,ALL                           STMNT 15  |
|* ..          STATUS BGPRT,ALL                           STMNT 16  |
|* ..          RJEND                                      STMNT 17  |
```

Figure 22. Example 2 - Use of BRDCSTR, MSGR, STATUS, OUTPUT, and DELETE Commands

Example 3 - Use of CONTINUE Command

Operator intervention is required in example 3 in Figure 23. The CONTINUE command must be used to resume processing.

PAYROLL logically attaches the terminal using its own 'userid' as termid in STMNT 1 and begins its user session with STMNT 2. Note that the LOGON command is still required with the proper 'userid'. The terminal operator has check forms on the printer when the session begins.

STMNT 3 requests the output from the job entry PAYCHECK, which should be printed on the blank check forms. The terminal operator determines from the first check printed that the check forms are not properly aligned with the printed output, and he turns off the printer. The RJE routine transmitting the output receives the signal that intervention is required at the terminal. The RJE routine writes a message on the terminal printer indicating that the CONTINUE command is required to resume transmission. The routine prepares to read from the terminal reader. If the card read is a CONTINUE command, it is processed by the routine. Otherwise, the RJEND routine flushes the terminal reader in preparation for the CONTINUE command, writes a message on the terminal printer indicating that the job stream has been flushed and prepares to read from the terminal reader. The terminal operator properly aligns the blank check forms and requests that the output be restarted (STMNT 4).

If the job entry PAYCHECK had a program failure resulting in a storage dump, the operator might change forms and use STMNT 4 to get the dump, or he might reply with * .. CONTINUE LOCAL, which would make the output available for printing at a local output writer.

```
* ..          RJSTART PAYROLL,BRDCST,2770,128          STMNT 1
* ..          LOGON PAYROLL                            STMNT 2
* ..          OUTPUT PAYCHECK                          STMNT 3

             Transmission is Interrupted by the Terminal Operator

* ..          CONTINUE BEGIN                           STMNT 4
* ..          RJEND                                    STMNT 5
```

Figure 23. Example 3 - Use of CONTINUE Command

Example 4 - Transmission Failure While Submitting Job Entries

In Example 4 in Figure 24 it is assumed that a transmission failure occurs during submission of Job Entry 2.

When a transmission failure occurs, the terminal operator must reestablish the line. This action requires an RJSTART command to logically attach the terminal once more, and the interrupted input must be resubmitted.

As soon as the line has been reestablished, the terminal operator verifies that Job Entry 2 did not enter the POWER system. The operator then completes job entry submission by allowing Job Entry 3 to precede Job Entry 2 while he checks the status report. The operator again gets a status report after Job Entry 2 is transmitted.

```
* ..          RJSTART DATAPROC,,3780,,NOPUNCH          STMNT 1
* ..          LOGON PROGR1                             STMNT 2
              .
              .
              Job Entry 1
              Job Entry 2

              Transmission Failure During Submission of Job Entry 2

* ..          RJSTART DATAPROC,,3780,,NOPUNCH          STMNT 1
* ..          LOGON PROGR1                             STMNT 2
* ..          STATUS BGRDR,ALL                         STMNT 3
              .
              .
              Job Entry 3
              Job Entry 2 (the job entry whose
              submission was interrupted
              by transmission failure)
              .
              .
* ..          STATUS BGRDR,ALL                         STMNT 4
* ..          LOGOFF                                   STMNT 5
* ..          RJEND                                    STMNT 6
```

Figure 24. Example 4 - Transmission Failure While Submitting Job Entries

Example 5 - Transmission Failure While Receiving Output

In the example in Figure 25 it is assumed that a transmission failure ocurs while receiving output.

When a transmission failure occurs, the terminal operator must reestablish the line. This action requires an RJSTART command to logically attach the terminal and request the output once more.

Even though the transmission was interrupted during receipt of the output from Job Entry 2, the transmission occurred in response to the general request for output. Repeating this request will cause Job Entry 2 output to be transmitted from the beginning. Job entry output is not deleted from the output queue until it has all been successfully transmitted. Therefore, if the OUTPUT command specified Job Entry 2 instead of ALL, the command could be reissued after reestablishing the line.

```
* ..          RJSTART DATAPROC,,2780                    STMNT 1
* ..          LOGON PROGR2                              STMNT 2
* ..          OUTPUT ALL                                STMNT 3

          Transmission Failure During Printing of Job Entry 2

* ..          RJSTART DATAPROC,,2780                    STMNT 1
* ..          LOGON PROGR2                              STMNT 2
* ..          OUTPUT ALL                                STMNT 3
* ..          RJEND                                     STMNT 4
```

Figure 25. Example 5 - Transmission Failure While Receiving Output

The linkage editor prepares programs for execution with DOS/VS and accepts as input the relocatable object modules produced by the language translators and object modules produced by the CSERV programs. It processes these modules into program phases, which may be immediately executed or cataloged into the core image library.

Job control calls the linkage editor program when a // EXEC LNKEDT control statement is read. Control is returned to job control when the link edit function is completed, unless the CATAL option was specified, in which case the CATAL function is completed before control is returned to job control.

The linkage editor program can run in either the background or a foreground partition. If it runs in the foreground, you must assign a private core image library (SYSCLB). In the background partition, the linkage editor defaults to the system core image library if no private core image library is assigned. The linkage editor issues a diagnostic message and terminates abnormally when you assign the private core image library across partitions.

If the supervisor supports the relocating loader, you do not need to write a self-relocating program to enable that program to execute in any real or virtual partition. The linkage editor will produce relocatable phases whenever possible. The linkage editor determines whether a phase can be made relocatable by inspecting the origin of the PHASE statement.

The linkage editor control cards direct the program to read an input module(s) and to form phases from the control sections within the modules. The linkage editor relocates the origin of each control section in the phase, assigns each phase an area of storage and a transfer address, and modifies the contents of the address constants in the phase.

The relocation factor for each control section is determined and saved by building a table called the control dictionary. This table contains the linkage editor phase definitions and the module ESD items. When complete, the table provides sufficient information for determining the location of each control section and for resolving any references between control sections.

The module TXT items are then built into phase blocks. The RLD items (address constants) are modified and inserted into the text. A transfer address is determined for each phase.

LANGUAGE TRANSLATOR MODULES

The input to the linkage editor consists of object modules and linkage editor control cards. Each module is the output of a complete language translator run. It consists of dictionaries and text for one or more control sections.

The dictionaries contain the information necessary for the linkage editor to resolve references between different modules. The text consists of the actual instructions and data fields of the module.

Six card types can be produced, by the language translators or by the programmer, to form a module. They appear in the following order:

Card Type	Definition
ESD	External symbol dictionary
SYM	Ignored by linkage editor
TXT	Text
RLD	Relocation list dictionary
REP	Replacement to text made by the programmer
END	End of module.

For the format of each of these cards (except SYM), see "Appendix B: Linkage Editor Summary".

The external symbol dictionary contains control section definitions and intermodule references. When the linkage editor has the ESDs from all modules, it can relocate the sections and resolve the references. Six types of entries are defined in the control dictionary.

ESD Type	Definition
SD	Section definition: provides control section name, assembled origin and length. Generated by a named START or a named CSECT in a source module.
WX	Generated by Weak External Reference (WXTRN), which has a function similar to EXTERN, except that WXTRN suppresses AUTOLINK. The linkage editor treats WX as an ER, NOAUTO.
PC	Private code: provides assembled origin and length for an unnamed control section.
LD/LR	Label definition: specifies the assembled address and the associated SD of a label that may be referred to by another module. The LD entry is termed LR (Label Reference) when the entry is matched to an ER entry.
ER	External reference: specifies the location of a reference made to another module. ER is generated by EXTRN or a V-type address constant in a source module.
CM	Common: indicates the amount of storage to be reserved for common use by different phases. CM is generated by COM in a source module.

The relocation list dictionary identifies portions of text that must be modified on relocation (address constants).

When the linkage editor reads a module, it stores ESDs in its control dictionary, writes TXT and REP items in core image blocks in the library, and writes RLD items on an RLD file. Each item that is identified by the language translators with an ESID number is reidentified by the linkage editor with a control dictionary number to avoid duplication between modules. All programs to be executed under DOS/VS must be link-edited and stored in the core image library. The core image library is either on SYSRES (the system core image library) or on SYSCLB (a private core image library). The linkage editor program operates in one of three modes:

- Catalog mode. An object module is link-edited and permanently stored in the core image library. The core image directory for cataloged phases is updated. If the phase is eligible for the shared virtual area and is indicated as SVA-eligible in the system directory list, the phase is also loaded into the SVA.
- Load and execute mode. An object module is link-edited for temporary storage in the core image library and is immediately executed.
- Assemble and execute mode. A source module is assembled or compiled. The object module (output) is link-edited for temporary storage in the core image library and is immediately executed.

LINKAGE EDITOR CONTROL STATEMENTS

In addition to the program cards previously listed, object modules used as input for the linkage editor include linkage editor control statements. There are four kinds of these control statements, each of which is described in detail further on in this section.

PHASE	Indicates the beginning of a phase. It gives the name of the phase and the storage address where it is to be loaded.
INCLUDE	Signals that an object module or parts thereof are to be included.
ENTRY	Provides an optional transfer address for the first phase.
ACTION	Specifies options to be taken.

General Control Statement Format

The linkage editor control statements are similar in format to statements processed by the assembler. The operation field must be preceded by one or more blanks. The operation field must begin to the right of column 1 and must be separated from the operand field by at least one blank position. The operand field is terminated by the first blank position. It cannot extend past column 71.

Control Statement Placement

If multiple-object modules are being prepared in a single linkage editor run, the single ENTRY statement should follow

the last object module. The ACTION statement(s) must be the first record(s) encountered in the input stream; otherwise, they are ignored.

PHASE and INCLUDE statements may be present on SYSRDR, SYSIPT, or in the relocatable library. Figure 26 shows the possible placement of the PHASE and INCLUDE statements.

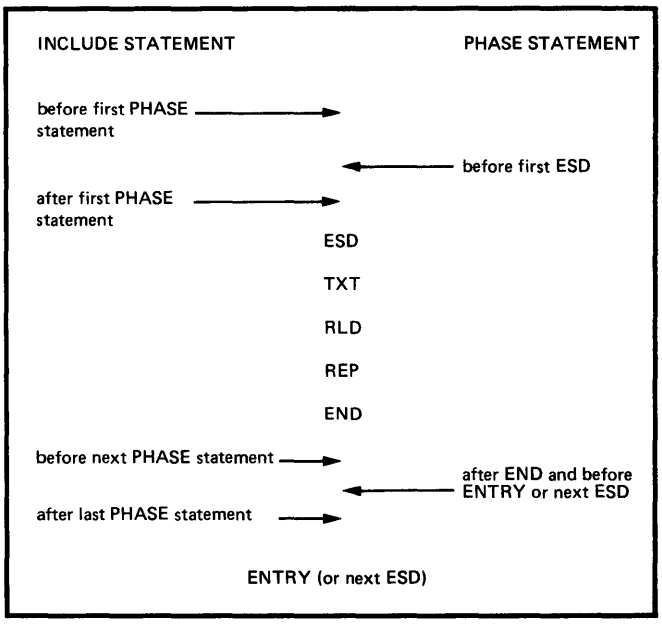


Figure 26. Placement of PHASE and INCLUDE Statements

INCLUDE statements within modules in the relocatable library must precede the ESD statement for the module.

PHASE STATEMENT

The PHASE statement must precede the first object module of each phase processed by the linkage editor. Under no circumstances can a PHASE statement occur within a control section. There can be several control sections within a phase. When several PHASE statements appear before an object module, each of the statements must be followed by at least one INCLUDE statement. Any object module not preceded by a PHASE statement is included in the current phase.

The first (or only) object module input for the linkage editor should include a PHASE control statement before the first ESD item. If no PHASE statement is used, or if the PHASE statement is in error, the linkage editor constructs a dummy statement. This allows testing of the program when the LINK option is used. However, the program with the dummy PHASE statement cannot be cataloged in a core image library; when the CATAL option is used, the job is canceled. The last (or only) object module may optionally be followed by an ENTRY control statement.

This statement provides the linkage editor with a phase name and an origin point for the phase. The phase name is used to catalog the phase into a core image library. This name is used in a FETCH or LOAD macro to retrieve the phase for execution. The PHASE statement is in the following format.

```
PHASE  name,origin[,NOAUTO][,SVA][,PBDY]
```

At least one blank must precede PHASE. The operands have the following meaning:

name Symbolic name of the phase. One to eight alphameric (0-9, A-Z, #, $,/, and @) characters are used as the phase name. The name may not be ALL.

origin Specifies the load address of the phase. If the origin of a phase was specified relative to the beginning of a partition, the linkage editor refers to the start address of the virtual partition to calculate the load address of the phase.

To run a program in a real partition, you can

- Link-edit the program with ACTION REL (see the ACTION statement) so that it can be relocated to a real partition when it is loaded.
- Write the program to be self-relocating.
- Link-edit the program with a PHASE statement that contains the absolute address of the location within the real partition where the program is to be loaded.

If COMMON is used, the length of the largest COMMON is added to every phase origin, even if the origin is given as an absolute value. COMMON is located at the beginning of the phase with the lowest origin address (if multiple phases).

The load address can be in one of six forms:

1. symbol[(phase)] [±relocation]	relative addresses
2. *[±relocation]	
3. S[±relocation]	
4. ROOT	
5. +displacement	absolute addresses
6. F+address	

A phase can be made relocatable if its origin is specified as a relative address (formats 1-4 above). However, if the address is relative to another phase which is not relocatable, the new phase will not be relocatable. Refer to the ACTION statement for additional information about the relocating loader.

The elements that make up the six forms that specify the origin signify the following.

1. symbol: May be a previously defined phase name, control section name, or external label (the operand of an ENTRY source statement).

   (phase): If symbol is a previously defined control section name or a previously defined external label that appears in more than one phase, phase (in parentheses) directs the linkage editor to the phase that contains the origin. The phase name must have been defined previously.

   relocation: Indicates that the origin of the phase currently being processed will be set relative to the symbol by a relocation term consisting of a + or a - immediately followed by: X'hhhhhh' (one to six hexadecimal digits), ddddddd (one to eight decimal digits), or nK.

2. *: The linkage editor assigns the next storage location in the virtual partition (with forced doubleword alignment) as an origin for the next phase.

   For the first PHASE statement in the background partition, * indicates that the origin is to be the first doubleword storage address after the partition save area, the label save area (if any), and the area assigned to the COMMON pool (if any).

   relocation: Indicates relocation of the phase relative to the next storage location of the virtual partition. The format is as specified in item 1.

3. S: If S is specified, the origin is determined in the same manner as the first PHASE statement in item 2.

   relocation: Indicates relocation of the phase relative to the start of the virtual partition as described in item 2.

4. ROOT: Tells the linkage editor that the phase that follows is a root phase. The storage address assigned to the root phase is determined in the same manner as the first PHASE statement in item 2. Only the first PHASE statement is permitted to specify ROOT. Any qualitative information (phase or relocation) is ignored when ROOT is specified. If a control section (CSECT) appears in the root phase, other occurrences of the same control section are ignored and all references are resolved to the control section in the root. (This does not apply to control sections and external references that begin with the letters IBM.) Control sections are not duplicated within the same phase. If any subsequent phase overlays any part of the ROOT phase, a warning diagnostic is displayed on SYSLST if ACTION MAP is specified. Refer also to ACTION Statement.

5. +displacement: Allows the origin (loading address) to be set at a specified location. The origin point is an absolute address, relative to zero.

   displacement must be: X'hhhhhh' (one to six hexadecimal digits), dddddddd (one to eight decimal digits), or nK. A displacement of zero (+0) would be used to denote a self-relocating program.

6. F+address: This format allows the origin of the program that is being link-edited in one

partition to be set at the start of another partition that is not allocated. If the other partition is allocated, ACTION BG or ACTION Fn has the same effect as F+address.

It also indicates that an area is to be reserved at the beginning of the other partition for the program name, a register save area, and label information. F should never be used for self-relocating programs. If COMMON is used, the COMMON start address is resolved to the first doubleword boundary after the reserved area at the beginning of the area specified by the F+displacement in the PHASE card.

address: The absolute storage address of the partition in which the link-edited program is to be executed. It may be specified by: X'hhhhhh' (four to six hexadecimal digits), ddddddddd (five to eight decimal digits), or nnnnK (n is two to four digits). For example, an address may be specified as +32K or +X'8000' or +32768. The origin of the phase is on the first doubleword boundary after the sum of address, the adjustment for the save area requirements, the label area and the length of the COMMON area, if applicable.

NOAUTO Indicates that the Automatic Library Lookup (AUTOLINK) feature is suppressed for both the private and system relocatable libraries. AUTOLINK collects each unresolved external reference from the phase. It then searches the private relocatable library (if assigned) and then the system relocatable library for a cataloged object module with the same name as each unresolved external reference. When a match is found, the module in the private or system relocatable library is link-edited into the phase. The AUTOLINK retrieved module must have an entry point matching the external reference in order to resolve its address. Unresolved external references are processed sequentially in alphameric order. Object-module cross references with labels identical to library object-module entry-point labels are erroneous. The use of NOAUTO as the last operand in a PHASE statement causes the AUTOLINK process to be suppressed for that phase only. (Also see ACTION Statement.)

SVA Indicates that the phase is SVA-eligible. This means that the phase must be reenterable and relocatable (link-edited for loading by the relocating loader). When this phase is cataloged into the system core image library, the linkage editor will also have the phase loaded into the SVA if the phasename was listed in the SDL with an SVA operand. If the linkage editor finds that a phase that is specified with the SVA operand is not relocatable, an error message is issued and the SVA operand is ignored.

PBDY Indicates that the phase is to be link-edited on a page boundary. If the current link-edit address is not aligned on a page boundary, the linkage editor uses the next higher page boundary address.

Note: It is not recommended that PBDY be specified for the first or only phase of a program.

Some examples of PHASE statements follow.

```
PHASE PHNAME,*+504
```

This causes loading to start 504 bytes past the end of the previous phase.

```
PHASE PHNAME3,PHNAME2
```

This causes loading to start at the same point where the loading of phase PHNAME2 started.

```
PHASE PHNAME,ROOT
```

Loading begins at the first doubleword after the beginning of the partition, the partition save area, the label save area (if any), and the area assigned to the COMMON pool (if any). When the PHASE statement contains a ROOT origin, this PHASE statement must be the first PHASE statement read by the linkage editor. Otherwise, it is treated as a symbol.

```
PHASE PHNAME,CSECT1(PHNAME2)
```

This causes loading to start at the point where CSECT1 was loaded. CSECT1, the named control section, must have appeared in the phase named PHNAME2.

```
PHASE PHNAME,F+X'6000'
```

This causes loading to start at 24K plus the length of the save area and label area.

```
PHASE PHNAME,F+32K
```

This causes loading to start at 32K plus the length of the save area and label area.

```
PHASE PHNAME1,F+30K
PHASE PHNAME2,*
PHASE PHNAME3,PHNAME2
```

The first phase (PHNAME1) of the preceding series is loaded starting at 30K plus the length of the save area and label area. The second phase (PHNAME2) of the series is loaded at the end of PHNAME1. The third phase (PHNAME3) is loaded at the same address as was PHNAME2, that is, at the end of PHNAME1.

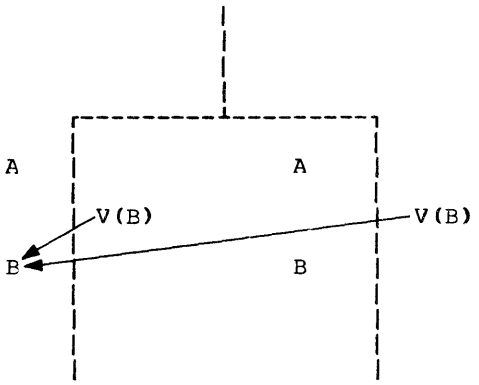
Note: In each of the preceding examples, if the origin address supplied is not on a doubleword boundary, the linkage editor automatically increments to the next doubleword boundary.

The linkage editor allows the inclusion of the same control section within each of several phases. If a control section (CSECT) appears in a ROOT phase, it does not appear in any other phase. (This does not apply to control sections that begin with the letters IBM.) A duplicate control section within the same phase will be ignored.

As external references occur in a phase, they are resolved preferentially with the entry point within the ROOT phase (if any), or the last previous occurrence of this entry point. For example, the coding

```
A   START
      .
      .
      .
    DC V(B)
      .
      .
      .
B   CSECT
      .
      .
      .
    END
```

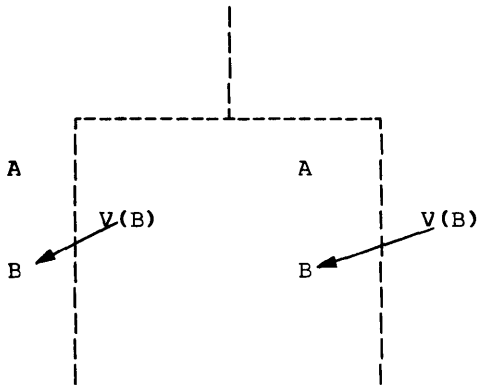
when used as a module in two phases has two different results. When the module is part of the ROOT phase, the external reference [DC V(B)] is resolved with the entry point within the ROOT phase (B CSECT). When the module is not part of the ROOT phase, the external reference is resolved with the last previous occurrence of this entry point. Since the reference is given before the CSECT labeled B is defined in that phase, it is resolved with the CSECT labeled B in the ROOT phase.



Whereas the coding

```
A   START
      .
B   CSECT
      .
A   CSECT
      .
      .
      .
    DC V(B)
      .
      .
      .
B   CSECT
      .
      .
      .
    END
```

when used as a module in two phases has the same result. When the module is part of the ROOT phase, the external reference [DC V(B)] is resolved with the entry point within the ROOT phase (B CSECT). When the module is not part of the ROOT phase, the external reference is resolved with the last previous occurrence of this entry point. Since the CSECT labeled B is defined in this phase before the reference is given, the external reference is resolved in the same phase. No problem arises from defining duplicate CSECTs in the same phase, since these are ignored.



This method of coding redefines the sequence of ESD information to allow valid cross reference by the linkage editor. This is also true in AUTOLINK mode, except for the case of privileged external references (external references whose labels begin with the letters IJ). For those references, if the resolution is not possible within the current phase or ROOT phase, then the AUTOLINK function is performed on this external reference at the end of the phase, and the other previously defined phases are not examined for possible resolution. If NOAUTO is specified, the IJ prefix is not privileged.

INCLUDE STATEMENT

INCLUDE indicates that an object module is to be included for editing by the linkage editor. It has two optional operands. When both operands are used, they must be in the prescribed order. When the first operand is omitted and the second operand is used, a comma must precede the second operand. The first operand indicates that the input is in the relocatable library. The second operand indicates that the input is in submodular structure. The names appearing in the namelist (second operand) are the names of selected control sections from which a phase is to be constructed.

If both operands are omitted, the object module to be included is assumed to be on SYSIPT. Job control copies it onto SYSLNK. Each series of relocatable modules on SYSIPT must be terminated by a /* control statement. INCLUDE statements with blank operands are recognized only on SYSRDR.

If only the first operand is present, the object module is assumed to be in either the private or the system relocatable library. The linkage editor first searches the private relocatable library (if assigned) and then the system relocatable library for the module. The module name must be the same as that used when the module was cataloged in the library. Including modules from the relocatable libraries permits the programmer to include standard subroutines in his program at link-edit time.

If only the second operand is present, the object module to be included is assumed to be in the input stream (SYSLNK). The linkage editor reads the object module and extracts the control section(s) indicated by the second operand of the INCLUDE.

Note: If this option is elected, the module must be preceded by an INCLUDE statement with a blank operand in order for job control to place the module on SYSLNK.

If both operands are present, the object module is read from the relocatable library and the indicated control section(s) are extracted.

The placement of the INCLUDE statement determines the position of the module in the program phase. An included module (in the relocatable library) can be preceded by one or more additional INCLUDE statements.

The format of the INCLUDE statement is:

```
INCLUDE   [modulename][,(namelist)]
```

At least one blank must precede INCLUDE.

modulename
: Symbolic name of the module, as used when cataloged in the relocatable library. It consists of one to eight alphameric characters.

(namelist)
: The linkage editor constructs a phase from only the control sections specified. The namelist is in the following format.

  (csname1,csname2,...)

  Entries within the parentheses are the names of the control sections that will be used to constitute a phase. When the namelist option is used and only selected control sections are included in a phase, a submodular phase is created. The counterpart of a submodular phase is a normal phase. A normal phase contains all control sections of one or more object modules. It is possible to include within the same phase an

object module(s) without the namelist option and an object module(s) specifying the namelist option. The total number of control sections in a namelist cannot exceed five; however, any number of INCLUDE statements can be used.

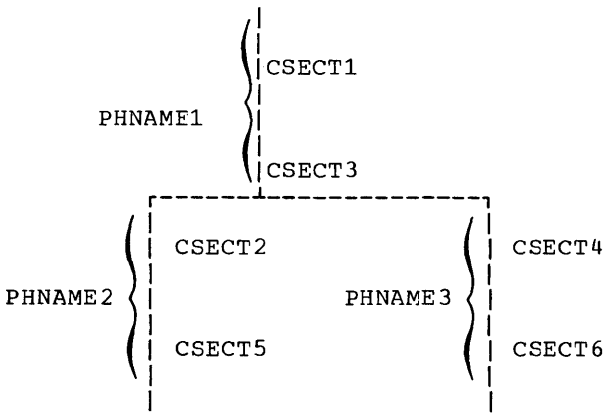
Modules in the relocatable library can be nested by using INCLUDE statements up to a depth of five (level of six). Modules included by INCLUDE statements read from SYSRDR are referred to as being in the first level. Modules included by statements in the first level are at the second level. Modules included by statements in the second level are at the third level, and so on up to six levels.

Submodular Structure

When several control sections are compiled together in one object module, it is sometimes desirable to break them up into several phases at link-edit time. This is done by using a PHASE statement followed by an INCLUDE statement with the namelist option. For example, in the sequence

```
PHASE    PHNAME1,*
INCLUDE  ,(CSECT1,CSECT3)
PHASE    PHNAME2,*
INCLUDE  ,(CSECT2,CSECT5)
PHASE    PHNAME3,PHNAME2
INCLUDE  ,(CSECT4,CSECT6)
```

the linkage editor structures the next module composed of CSECT1-CSECT6 in three overlays as shown:



The absence of the first operand in the INCLUDE statement indicates that the control sections are to be incorporated from the next succeeding module in the input stream.

The preceding sequence of PHASE and INCLUDE statements may be read by job control onto SYSLNK in one of two ways:

- If the PHASE and INCLUDE statements are on SYSRDR, an INCLUDE statement with a blank operand must follow the sequence to read the module (on SYSIPT) containing CSECT1-CSECT6 onto SYSLNK.

- If the PHASE and INCLUDE statements are on SYSIPT (immediately preceding the module), an INCLUDE statement with a blank operand on SYSRDR directs job control to read everything onto SYSLNK from SYSIPT down to the /* statement.

PHASE and INCLUDE statements can also be in the relocatable library. This implies that submodular phases can be constructed from modules in the relocatable library. If PHASE and INCLUDE statements come from the relocatable library (via an INCLUDE MODNAME), then the control sections for that module are in the relocatable library. In this structure, the required control sections (in the relocatable library) immediately follow the last INCLUDE statement. For example, in the sequence

```
PHASE    PHNAME1,*
INCLUDE  MODNAME1,(CSECT1,CSECT3)
PHASE    PHNAME2,*
INCLUDE  MODNAME1,(CSECT2,CSECT5)
PHASE    PHNAME3,PHNAME2
INCLUDE  MODNAME1,(CSECT4,CSECT6)
```

the linkage editor structures the next module (cataloged in the relocatable library under MODNAME1) composed of CSECT1-CSECT6 into the same three overlays as shown in the preceding example.

If MODNAME1 contains an INCLUDE statement, the linkage editor interprets this to mean that the module to be included should also be searched for the control sections requested in the namelist. For example, in the relocatable library if MODNAME1 contains

```
INCLUDE  MODNAME2
CSECT3
CSECT5
CSECT6
```

and in the relocatable library MODNAME2 contains

```
CSECT1
CSECT2
CSECT4
```

upon encountering an

```
INCLUDE  MODNAME1,(CSECT1,CSECT3)
```

statement, the linkage editor goes to MODNAME1 and finds INCLUDE MODNAME2. The linkage editor then goes to MODNAME2 and

extracts CSECT1 and returns to MODNAME1 and extracts CSECT3.

A nonsubmodular INCLUDE statement may be placed before or after a submodular INCLUDE statement. This results in the addition of the included module into the phase at the point the INCLUDE statement is encountered. For example, if MOD1 contains CSECT4 and CSECT5, the sequence

```
PHASE    PHNAME1,*
INCLUDE  ,(CSECT1,CSECT3)
INCLUDE  MOD1
```

(Object module containing CSECT1 and CSECT3)

results in the following structure:

```
PHNAME1  CSECT1
         CSECT3
         CSECT4
         CSECT5
```

while the sequence

```
PHASE    PHNAME1,*
INCLUDE  MOD1
INCLUDE  ,(CSECT1,CSECT3)
```

(Object module containing CSECT1 and CSECT3)

results in the following structure:

```
PHNAME1  CSECT4
         CSECT5
         CSECT1
         CSECT3
```

Note: Both of the following statements produce the same result.

```
INCLUDE  ,(CSECT1,CSECT3)
INCLUDE  ,(CSECT3,CSECT1)
```

That is, CSECT1 and CSECT3 are in storage in that sequence. This is because the linkage editor extracts control sections in the order in which they appear in the input stream, not as they are ordered in the namelist. In order to have CSECT3 physically located ahead of CSECT1 in storage, two INCLUDEs must be used:

```
INCLUDE  ,(CSECT3)
INCLUDE  ,(CSECT1)
```

As no diagnostic is given if a control section, specified in the namelist, is not present in the indicated module, you can inspect the MAP supplied by the linkage editor to determine if the proper control sections are in the correct phases.

ENTRY STATEMENT

Every program, as input for the linkage editor, is terminated by an ENTRY statement. Its format is:

```
ENTRY      [entrypoint]
```

At least one blank must precede ENTRY.

entrypoint — Symbolic name of an entry point. It must be the name of a CSECT or a label definition (source ENTRY) defined in the first phase. This address is used as the transfer address to the first phase in the program. If the operand field is blank, the linkage editor uses as a transfer address the first significant address provided in an END record encountered during the generation of the first phase. If no such operand is found on the END card, the transfer address is the load address of the first phase.

It is necessary to supply the ENTRY statement only if a specific entry point is desired. Job control writes an ENTRY statement with a blank operand on SYSLNK when EXEC LNKEDT is read to ensure that an ENTRY statement will be present to halt link editing.

ACTION STATEMENT

This statement is used to indicate linkage editor options. When used, the statement must be the first linkage editor record(s) in the input stream. If multiple operands are required, they can be placed in separate ACTION statements or in one ACTION statement separated by commas. Its format is:

```
ACTION {REL  }[,CLEAR][,MAP  ] [,NOAUTO]
       {NOREL}        [,NOMAP]
        [,CANCEL][,BG]
                 [,Fn]
```

At least one blank must precede ACTION.

CLEAR — Indicates that the unused portion of the core image library will be set to binary zero before the beginning of the linkage editor function. CLEAR is a time-consuming function. It should be used only if it is necessary to fill areas defined by DS statements with zeros.

MAP Indicates that SYSLST is available for diagnostic messages. In addition, a map of virtual storage is printed on SYSLST. The map contains the name of every entry within each CSECT and the name of every CSECT within each phase.

NOMAP Indicates that SYSLST is not available when performing the link-edit function. Storage mapping is not performed and all linkage editor error diagnostics are listed on SYSLOG.

NOAUTO Indicates the AUTOLINK function is to be suppressed during the link editing of the entire program. AUTOLINK will be suppressed for both the private and the system relocatable libraries.

Note: When a WX is encountered, it is treated in the same manner as an EXTRN, NOAUTO.

CANCEL Cancels the job automatically if any of the errors 2100I through 2170I occur. If this option is not specified, the job continues.

BG
F1
F2
F3
F4 Sets the end-of-supervisor address used in linkage editor calculations to the beginning of the virtual partition specified, plus the length of the label area and of the save area. The end-of-supervisor address in the communication region is not changed.

The BG, F1, F2, F3, and F4 operands link edit a program to execute in a partition other than that in which the link edit function is taking place. Programs that have a phase origin of S (or * for the first phase of a program) are originated to the specified virtual partition.

Use of the ACTION BG statement is possible only in a system supporting more than one partition and the private core image library option when the linkage editor is executing in a foreground partition.

Use of the ACTION Fn statement in a multiprogramming environment requires that the partition be allocated. If these operands are used in a non-multiprogramming environment, they are ignored. If none of these operands are present, the program is link edited to execute in the virtual partition or in its associated real partition in which link-editing takes place, unless otherwise specified in the PHASE statement.

REL Indicates that the phase(s) produced during this execution of the linkage editor is (are) to be made relocatable, if possible. The format of the origin specified in the PHASE statement determines whether or not a relocatable phase can be produced. (Refer to the origin operand in the PHASE statement.) If support for the relocating loader was generated in the supervisor, ACTION REL is the default. At program execution time, a relocatable program can be loaded into any partition. For a more detailed description of the relocating loader and its use, refer to the DOS/VS System Management Guide, GC33-5371.

NOREL Indicates that the phase(s) produced during this execution of the linkage editor is (are) not to be made relocatable. If support for the relocating loader was not generated in the supervisor, ACTION NOREL is the default.

An ACTION statement flagged as invalid (as the result of an invalid operand, etc.), ignores all subsequent ACTION statements submitted during the job.

The ACTION statement is not required. If the MAP option is specified, SYSLST must be assigned. If the statement is not used and SYSLST is assigned, MAP is assumed and a map of virtual storage and any error diagnostics are printed on SYSLST. If the statement is not used and SYSLST is not assigned, NOMAP is assumed.

The following information is contained in the storage map.

1. The name of each phase, the lowest and highest virtual storage locations of each phase, and the hexadecimal disk address where the phase begins in the core image library.

2. An indication if the phase is a ROOT phase, or if a phase overlays the ROOT phase in any way (designated by OVERROOT).

3. The length of COMMON, if appropriate.

4. The names of all CSECTs belonging to a phase, the address where each CSECT is loaded, and the relocation factor of each CSECT.

5. All defined entry points within a CSECT. If an entry point is unreferenced, it is flagged with an asterisk (*).

6. The names of all external references that are unresolved.

7. The transfer (execute) address of each phase.

8. An indication that the phase is relocatable, self-relocating, not relocatable, or SVA eligible.

9. Warning messages are printed if:

   - The ROOT phase has been overlaid;
   - A possible invalid entry point duplication occurred;
   - The ENTRY or END statement contained an invalid (undefined) transfer label;
   - At least one control section had a length of zero;
   - The assembled origin on an RLD statement was outside the limits of the phase;
   - An address constant could not be resolved.

These messages may or may not indicate actual programming errors. If NOMAP is operational, the warning messages are not printed.

The difference between specifying NOAUTO in a PHASE statement and specifying ACTION NOAUTO. The NOAUTO operand in a PHASE statement indicates to the Linkage Editor that AUTOLINK is to be suppressed for that phase only. If an entire program requires NOAUTO, then specifying ACTION NOAUTO cancels AUTOLINK during link editing of the entire program, thereby eliminating the necessity of specifying NOAUTO in each PHASE statement.

Figure 27 shows a storage map and a diagnostic listing produced on SYSLST.

For the line numbers referred to in the following discussion, see Part 1 of Figure 27.

1. Line 1 (ACTION TAKEN). MAP and REL have been specified on separate ACTION cards. Had NOAUTO been specified, it would also appear on this line.

2. Lines 3, 13, 15, 17, 19, 21, 23, 25, and 27. These lines are printed when the statement is read by the linkage editor.

When a module is included from the relocatable library, it is not possible to guarantee that the sequence identification printed in columns 8-15 is that of the record printed. This occurs because the MAINT librarian program reblocks the content of the cards to a more compressed format.

```
     JOB  NO NAME   31/07/73    DOS LINKAGE EDITOR DIAGNOSTIC OF INPUT

  1  ACTION TAKEN  MAP REL
  2  LIST   INCLUDE IJBSL2                                              LNK00020
  3  LIST           INCLUDE   IJBMIN             INITIALIZATION         03000000
  4  LIST   PHASE MAINT,+0,NOAUTO
  5  LIST   INCLUDE IJJCPDIN    LIOCS  I/O MODULE
  6  LIST   INCLUDE IJBMUP      DISK ADDRESS UPDATE ROUTINE
  7  LIST   INCLUDE IJBMIO      DISK I/O ROUTINE
  8  LIST   INCLUDE IJBMCS      CARD SCAN ROUTINE
  9  LIST   INCLUDE IJBLBC      LIBRARIAN ERROR ROUTINE
 10  LIST   INCLUDE IJBLBA      MAINT FETCH ROUTINE
 11  LIST   INCLUDE IJBMDU      DIRECTORY UPDATE ROUTINE
 12  LIST   INCLUDE IJBMDS      DIRECTORY SCAN ROUTINE
 13  LIST           INCLUDE    IJBLBE             MAINTR2                06000000
 14  LIST   PHASE MAINTR2,MAINTSUB,NCAUTO
 15  LIST           INCLUDE    IJBLBD             MAINTDR                09000000
 16  LIST   PHASE MAINTDR,MAINTSUB,NCAUTO
 17  LIST           INCLUDE    IJBLBF             MAINTS2                12000000
 18  LIST   PHASE MAINTS2,MAINTSUB,NCAUTO
 19  LIST           INCLUDE    IJBLBN             MAINTP2              PM 15000000
 20  LIST   PHASE MAINTP2,MAINTSUB,NCAUTO
 21  LIST           INCLUDE    IJBLBL             MAINTA                 18000000
 22  LIST   PHASE MAINTA,MAINTSUB,NCAUTO
 23  LIST           INCLUDE    IJBLBM             MAINTCL                21000000
 24  LIST   PHASE MAINTCL,MAINTSUB,NCAUTO
 25  LIST           INCLUDE    IJBLBG             MAINTCN                27000000
 26  LIST   PHASE MAINTCN,MAINTSUB,NCAUTO
 27  LIST           INCLUDE    IJBLBQ             MAINTUP                33000000
 28  LIST   PHASE MAINTUP,MAINTSUB,NCAUTO
 29  LIST   ENTRY
```

Figure 27. Storage Map (Part 1 of 3)

```
1/07/73   PHASE   XFR-AD  LOCORE  HICCRE  DSK-AD    ESD TYPE  LABEL     LOADED  REL-FR
       MAINT      00099A  000000  0015D7  029 13 01 CSECT     IJJCPDIN  000000  C00C0C  SELF RELOCATING
                                                      ENTRY   IJJCPD3   000000

                                                    CSECT     IJBMUP40  000298  000298
                                                      ENTRY   DKADUP    000298
                                                      ENTRY   VIJBMUP   000300

                                                    CSECT     IJBMI040  000308  C00308
                                                      ENTRY   RDENT     000308
                                                      ENTRY   WTFMENT   000314
                                                      ENTRY   WTDATENT  000358
                                                      ENTRY   IOSTART   000308
                                                      ENTRY   VIJBMIO   000418

                                                    CSECT     IJBMCS50  000448  000448
                                                      ENTRY   CSSTART   000448
                                                      ENTRY   CSCCNT    0004F2
                                                      ENTRY   NEWREAD   000464
                                                      ENTRY   IJSYSIN   000668
                                                      ENTRY   ENDJOB    000582
                                                      ENTRY   INPUT     000724
                                                      ENTRY   EOF       000560
                                                      ENTRY   P2ECF     000564
                                                      ENTRY   SETCF     00057C
                                                      ENTRY   INPUT1    000722
                                                    *ENTRY    COMMBYTE  00080F
                                                      ENTRY   VIJBMCS   000814
                                                      ENTRY   STATTAB   0006E2

                                                    CSECT     IJBERR40  000828  00828
                                                      ENTRY   ERSTART   000828
                                                      ENTRY   AREA      000875
                                                      ENTRY   IJSYSLS   0008F8
                                                    *ENTRY    ASA       000873
                                                      ENTRY   SKIPMV    00083A
                                                      ENTRY   COUNT     000872
                                                      ENTRY   VIJBLBC   0008F0

                                                    CSECT     IJBMNT41  000990  000990
                                                      ENTRY   INITABLE  000ED4
                                                    *ENTRY    BEGINN    00099A
                                                      ENTRY   BEGINN1   00099C
                                                      ENTRY   PCILEXT   000EFD
                                                      ENTRY   PRELEXT   000C01
                                                      ENTRY   PSSLEXT   000C05
                                                      ENTRY   MNTLP     000ECC
                                                      ENTRY   MNTRETN   0009F0

                                                    CSECT     IJBMDU50  000D80  000D80
                                                      ENTRY   VIJBMDU   000F40
                                                      ENTRY   TRACKS    000E63
                                                      ENTRY   SSRECD    000F3B
                                                      ENTRY   RLRECD    000F3C
                                                      ENTRY   PLRECD    000F3A
```

Figure 27. Storage Map (Part 2 of 3)

```
1/07/73   PHASE   XFR-AD  LOCORE  HICORE  DSK-AD    ESD TYPE  LABEL     LOADED  REL-FR

                                                      ENTRY   DUSTART   000D80
                                                      ENTRY   DUCLD     000ED6

                                                    CSECT     IJBMDS40  000F58  000F58
                                                      ENTRY   VIJBMDS   001004
                                                      ENTRY   MAINTSUB  001018
                                                      ENTRY   DSSTART   000F58
                                                      ENTRY   DSCCNT    000FD0
                                                      ENTRY   READNXT   000F64

                                                    CSECT     IJBMIN50  001018  001018
                                                      ENTRY   VIJBMIN   0013C0
                                                      ENTRY   INSTART   001018

     MAINTR2   001022  001018  00208F  02A 00 01 CSECT       IJBMAR40  001018  C01018  NOT RELOCATABLE
     MAINTDR   001022  001018  001F07  02A 00 06 CSECT       IJBMDR40  001018  001018  NOT RELOCATABLE
                                                      ENTRY   MAINDIR   001260
                                                    *  ENTRY   DRSTART   001022

     MAINTS2   001022  001018  0021FA  02A 01 04 CSECT       BEGIN     001018  001018  NOT RELOCATABLE
                                                    *  ENTRY   CATENT    001022

     MAINTP2   001022  001018  00193C  02A 02 03 CSECT       BEGIN     001018  001018  NOT RELOCATABLE
                                                      ENTRY   NCECF     001442
                                                    *  ENTRY   CATALP    001022

     MAINTA    001022  001018  002FD7  02A 02 06 CSECT       IJBMAA41  001018  001018  NOT RELOCATABLE

     MAINTCL   001022  001018  001584  02A 04 02 CSECT       IJBMCL40  001018  001018  NOT RELOCATABLE

     MAINTCN   001022  001018  002817  02A 04 04 CSECT       IJBCON50  001018  C01018  NOT RELOCATABLE

     MAINTUP   001022  001018  002CE7  02A 05 04 CSECT       IJBUPD50  001018  C01018  NOT RELOCATABLE

                                                    CSECT     BCCK      0029B0  001018
```

Figure 27. Storage Map (Part 3 of 3)

LINKAGE EDITOR INPUT CONSIDERATIONS

The storage requirements for a link-edit run depend on:

- Input to the linkage editor (number of PHASE statements and number of ESD items).

- Whether $MAINDIR (the phase that is called by the linkage editor and librarian programs to maintain the core image directory) runs in the SVA or not.

  Note: It is assumed that $LIBSTAT (the phase that prints out the status report of the libraries) runs in the SVA if $MAINDIR does.

- The start address of the linkage editor during execution. (The work area for the linkage editor starts on a 1K boundary, while the linkage table starts on a page boundary. In the following storage estimate formula, the worst case is assumed, that is, the maximum storage amount of 2K is used to ensure correct alignment.)

In a virtual partition of 64K with $MAINDIR running in the SVA the linkage editor can process at least 50 phases with a total number of 1700 unique ESD items.

A unique ESD item is defined as being an occurrence in the control dictionary. All symbols that appear in the MAP are unique occurrences. A symbol that occurs several times in the input stream is normally incorporated into a unique ESD item. However, if the same symbol occurs in different phases (for example, control sections), each resolved occurrence of the symbol within a different phase is a unique ESD item.

You can use the following formula for storage estimates. If the relation is satisfied, then you have enough address space for the link-edit run.

$$26{,}900 + M + ST + 52 * x + 20 * y \leq P$$

where M = 0 if $MAINDIR runs in SVA
10,240 if $MAINDIR runs in partition

ST = 30 * x if 30 * x < 2048
2048 if 30 * x ≥ 2048

x = number of PHASE statements

y = total number of unique ESD items

P = available storage in partition.

LINKAGE EDITOR JOB SETUP

When link editing in the foreground, a private core image library (SYSCLB) must be uniquely assigned to the partition. The program phase (output of the linkage editor) is put in the private core image library. In the background, the linkage editor can put a phase in either a private or the system core image library. If SYSCLB is uniquely assigned in the background, the linkage editor output is put in the private core image library. If SYSCLB is not assigned, the system core image library is used.

When performing a link-edit function, the following system and programmer logical units are used. SYSRDR and SYSIPT may contain input for the linkage editor. This input is written onto SYSLNK by job control.

Unit	Function
SYSRDR	Control statement input (via Job Control)
SYSIPT	Module input
SYSLST	Programmer messages and listings
SYSLOG	Operator messages
SYSLNK	Input to the Linkage Editor
SYS001	Workfile

In normal operations, all preceding logical units must be assigned. In a unique circumstance (when all modules to be link-edited are in the relocatable library), SYSIPT would not need to be assigned.

If output from the linkage editor is to be placed in a private core image library, the following symbolic unit is also required:

SYSCLB The private core image library

A link-edit job is set up in the following manner.

Control Statement	Remarks
// JOB	Required only if this is the first job step of a job.
// ASSGN	Required only if device assignments are to differ from the system standard assignments. Units that can be assigned are SYSRDR, SYSIPT, SYSLST, SYSLNK, and SYS001.

ASSGN SYSCLB	Required if output of linkage editor is to be placed in a private core image library.
// OPTION	OPTION statement must follow the ASSGN statement (if any) for SYSLNK.
ACTION	Optional ACTION statement (with appropriate operands) must precede the first linkage editor control statement.
PHASE INCLUDE	As many PHASE and INCLUDE statements as are required are used to construct phases from the modules input to the linkage editor.
ENTRY	Optional statement to provide a transfer address for the first phase.
// LBLTYP	LBLTYP statement (if required) to define the amount of storage to be reserved at link-edit time for processing of tape or nonsequential DASD file labels in the virtual storage partition.
// EXEC LNKEDT	EXEC statement to call the linkage editor from the core image library. Job control creates an ENTRY statement on SYSLNK to ensure its presence to halt link editing.
/&	End-of-job statement.

When link-editing multiple object modules into one program phase, make sure that the linkage editor selects the intended entry point. Either specify or place the main control section first in the linkage editor input, or use a linkage editor ENTRY statement with the name of the main control section as the entry-point operand.

EXAMPLE OF LINKAGE EDITOR INPUT AND OUTPUT

The program shown in Figure 28 illustrates the rules governing input for the linkage editor and shows the output obtained. Though this example is somewhat more complex than the normal program, by following the flow of the input, one can find practically every situation that may arise.

The leftmost block shows control statements being read by job control from SYSRDR. The next block is read by job control from SYSIPT and contains an object module (module 1) and a source module to be assembled. The next block shows the output from job control on SYSLNK, which is the input to the linkage editor. The next two blocks represent two levels in the relocatable library. The rightmost block shows the output phases as they appear in the temporary portion of the core image library after the execution of the linkage editor function. A detailed sequence of events follows.

Linkage editor control statements are read by job control from SYSRDR and are copied on SYSLNK until an INCLUDE statement with a blank first operand is read. This statement is not copied on SYSLNK. Instead, job control copies the module on SYSIPT onto SYSLNK until a /* statement is read. Job control then reads from SYSRDR. An assembly is executed and its output is written directly on SYSLNK. (It is assumed that LINK was specified in an OPTION statement preceding the linkage editor control statements.) Job control then writes the ENTRY statement with a transfer label for CS A on SYSLNK and issues a fetch for the linkage editor.

The linkage editor reads from SYSLNK and starts to create a program. An INCLUDE statement with a first operand signals the linkage editor to access the relocatable library. This is the first level of an INCLUDE. In the first level of the relocatable library, the linkage editor reads an INCLUDE (for the second level) and performs this inclusion. As no INCLUDE is present in the second level, control is returned to the calling input level. This process is repeated for the next INCLUDE. Note that the namelist specifies only CS C is wanted.

After the inclusion of the module at the first level, control is returned to SYSLNK where a new phase is encountered. The control sections are read from SYSLNK and added to PHASE2 until the next INCLUDE is read. At this time, the linkage editor again accesses the relocatable library, performs the inclusion of MOD5 into PHASE2, and continues reading input from SYSLNK. Processing continues until the ENTRY statement is reached.

The split control section (CS E) is assigned a contiguous area of virtual storage.

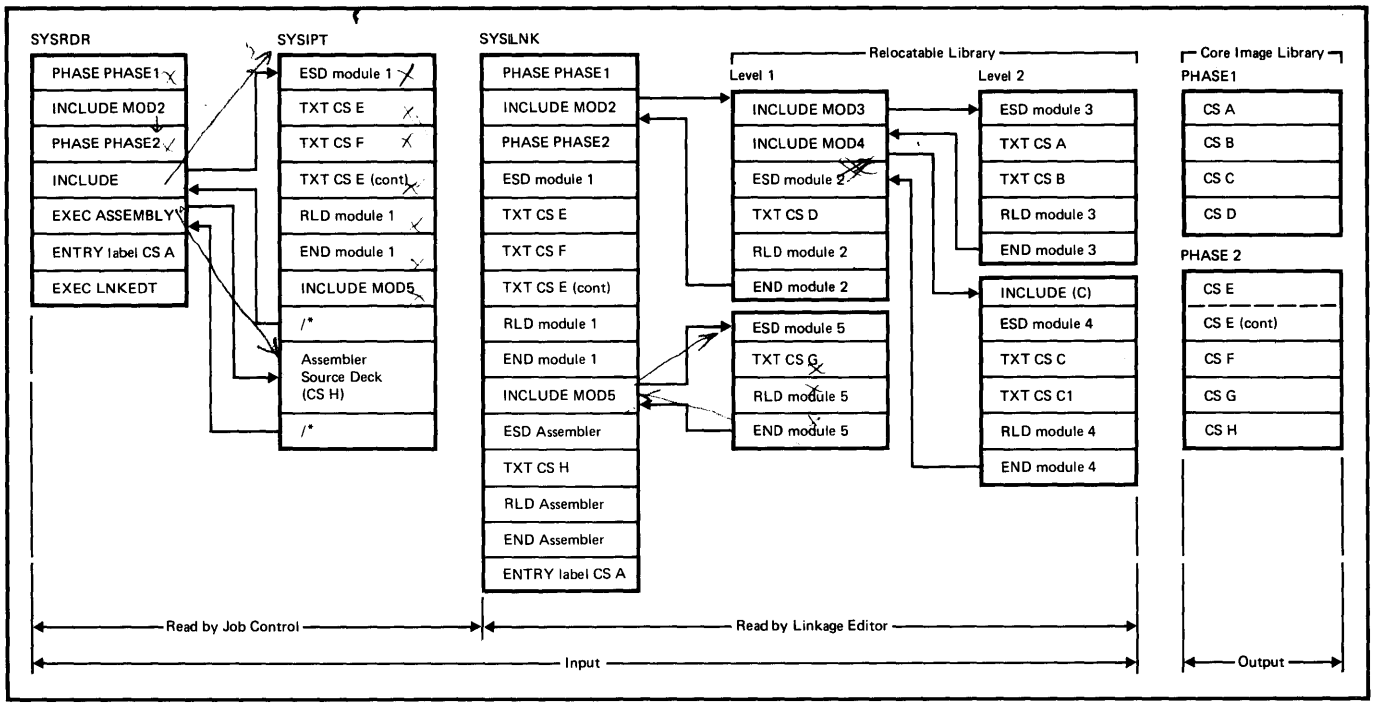


Figure 28. Example of Linkage Editor Input and Output

This section describes the set of programs that maintain, service, and copy the libraries of DOS/VS. This set of programs is collectively referred to as the librarian.

The system residence (SYSRES) can contain four separate and distinct system libraries:

1. Core image library
2. Relocatable library
3. Source statement library
4. Procedure library.

The core image library is the only library that is required.

Figure 29 lists the logical units required and used by the librarian programs.

	MAINT	CORGZ	DSERV	CSERV	RSERV	SSERV	PSERV	ESERV
SYSRDR[1]	R	R	R	R	R	R	R	
SYSIPT	R	R	R	R	R	R	R	R
SYSLST	O	R	R	O	O	O	O	C
SYSLOG[2]	R	R	R	R	R	R	R	R
SYSRES	R	R	R	R	R	R	R	R
SYSCLB	O	O	O	O				
SYSRLB	O	O	O		O			
SYSSLB	O	O	O			O		O
SYS000		C						
SYS001		C						
SYS002		C						
SYS003		C						
SYSIN[3]	O	C	O	O	O	O	O	C
SYSPCH	O			O	O	O	O	C

R = Required
O = Optional dependent upon function specified

[1]SYSRDR is required for job control purposes only.
[2]SYSLOG must not be assigned to a printer
[3]If SYSRDR and SYSIPT are assigned to the same device, SYSIN may be used.

Figure 29. Logical Units Required and Used by the Librarian Programs

DISK STORAGE SPACE REQUIRED FOR LIBRARIES AND DIRECTORIES

You must determine the amount of space allocated to each of the libraries and directories. Each library consists of one or more complete disk tracks. Each directory occupies the first track(s) of the first cylinder allocated to its respective library.

DIRECTORY SIZES

Figure 30 summarizes the track requirements for the core image, relocatable, source statement, and procedure directories.

CORE IMAGE LIBRARY SIZE

Each track allocated to the core image library contains three fixed-length blocks on 2311, six fixed-length blocks on

	Directory			
	Core Image	Relocatable	Source Statement	Procedure
NUMBER OF ENTRIES:				
2311*		--	--	--
2314/2319 first track		335 module entries	265 book entries	265 procedure entries
2314/2319 other tracks		340 module entries	270 book entries	270 procedure entries
2314/2319 last track		339 module entries	269 book entries	269 procedure entries
3330/3333 first track	Variable (see Note)	555 module entries	435 book entries	435 procedure entries
3330/3333 other tracks		560 module entries	440 book entries	440 procedure entries
3330/3333 last track		559 module entries	439 book entries	439 procedure entries
3340 first track		335 module entries	255 book entries	255 procedure entries
3340 other tracks		340 module entries	260 book entries	260 procedure entries
3340 last track		339 module entries	259 book entries	259 procedure entries
NUMBER OF TRACKS:				
2311*		--	--	--
2314/2319	Variable (see Note)	TRD = $\frac{m+6}{340}$	TSD = $\frac{b+6}{270}$	TPD = $\frac{d+6}{270}$
3330/3333		TRD = $\frac{m+6}{560}$	TSD = $\frac{b+6}{440}$	TPD = $\frac{d+6}{440}$
3340		TRD = $\frac{m+6}{340}$	TSD = $\frac{b+6}{260}$	TPD = $\frac{d+6}{260}$

m = Total number of modules in the relocatable library.
b = Total number of books in the source statement library.
d = Total number of procedures in the procedure library.

The value TxD is rounded to the next higher integer if a remainder results.

*The 2311 is supported as a private core image library only.

Note: The entries in the core image directory are of variable length with a maximum length of 30 bytes. The length of the entries is determined by the information contained in them. The load point at link-edit time, the entry point at link-edit time, the number of RLD items, the number of additional RLD blocks, and the partition start address at link-edit time are only part of the directory entry under certain conditions. The number of blocks (256 bytes) per track is 10 for the 2311 (only private core image library), 17 for the 2314/2319, 28 for the 3330/3333, and 16 for the 3340.

Figure 30. Calculation of the Tracks Required for Directories

2314/2319, eleven fixed-length blocks on 3330/3333, or seven fixed-length blocks on 3340. Each block contains 1024 bytes of instructions or data. For non-relocatable phases, the core image library contains exactly the same information as is loaded into virtual storage for execution. For relocatable phases, the CIL contains both TXT and RLD information. Each phase is written beginning in a new block. The number of tracks required for the core image library can be calculated as follows:

1. Determine the number of blocks (B) required for a phase:

   $$B = \frac{L}{1024}$$

   where L is the total number of bytes in the phase (rounded up to a multiple of 4) plus 4 times the number of RLD items (see the assembly listing). The value B is rounded to the next higher integer if a remainder results.

2. Determine the total number of blocks (Bt) required for all phases in the core image library:

   Bt = B1 + B2 + B3 +....+ Bn

3. Determine the number of tracks (TCL) required to hold all phases in the core image library:

   $$TCL = \frac{Bt}{n}$$

   where n = 3 for the 2311 (supported as a private core image library only)
   6 for the 2314/2319
   11 for the 3330/3333
   7 for the 3340

4. Determine the number of cylinders (CCL) required to hold the core image library and core image directory:

   $$CCL = \frac{TCD+TCL}{n}$$

   where n = 10 for the 2311 (supported as a private core image library only)
   20 for the 2314/2319
   19 for the 3330/3333
   12 for the 3340

   The value of CCL is rounded to the next higher integer if a remainder results. This calculation is useful when executing MAINT and CORGZ. When allocating a SYSRES file, add two tracks for system purposes.

RELOCATABLE LIBRARY SIZE

Each track allocated to the relocatable library contains 16 fixed-length blocks for the 2314/2319, 28 fixed-length blocks for the 3330/3333, or 17 fixed-length blocks for the 3340. Each block is 322 bytes long. A number of factors affects the packing of information in these blocks. The factors include the following variables:

1. The number of separate control sections.
2. The use of DS (define storage) statements, which reserve storage that may or may not be utilized for data constants defined in the program.
3. Alternation of the location counter during assembly (use of CRG statements).

The following calculations approximate fairly accurately the library area required for typical programs.

1. Determine the number of blocks (Bc) required for all cards or statements except the actual program text. Assume a separate block for each card of the following types:

   a. PHASE
   b. INCLUDE
   c. REP
   d. END
   e. SYM
   f. ENTRY

   Let Bc equal the total number of cards of the above types.

2. Determine the number of blocks (Be) required for ESD and RLD cards. Assume a separate block for every two ESD or RLD cards.

3. Determine the number of blocks (Bi) required for the actual instructions or data in the TXT cards. Assume an average of 200 bytes of text in each block. (A maximum per block, for continuously assigned text, is 264 bytes per block.) Thus:

   $$Bi = \frac{\text{total bytes of text in TXT cards}}{200}$$

4. Determine the total number of blocks (Bn) required for a module in the relocatable library:

   Bn = Bc + Bi + Be

5. Determine the total number of blocks (Bt) required to hold all of the modules in the library:

   Bt = B1 + B2 + B3 +....+ Bn

6. Determine the number of tracks (TRL)

   $$TRL = \frac{Bt}{n}$$

   where n = 16 for the 2314/2319
             26 for the 3330/3333
             17 for the 3340

   The value TRL is rounded to the next higher integer if a remainder results.

7. Determine the number of cylinders (CRL) required to hold the relocatable library and directory:

   $$CRL = \frac{TRD+TRL}{n}$$

   where n = 20 for the 2314/2319
             19 for the 3330/3333
             12 for the 3340

   The value CRL is rounded to the next higher integer if a remainder results.

SOURCE STATEMENT LIBRARY SIZE

Each track allocated to the source statement library contains 27 fixed-length blocks for the 2314/2319 or 44 fixed-length blocks for the 3330/3333 or 26 fixed-length blocks for the 3340). Each block contains a maximum of 160 bytes of source statement information. The source statements are compressed before they are written out on the source statement library. This compression is performed by eliminating all blanks in each source statement. Several count bytes indicating the number of blanks eliminated are added to each statement before writing it in the source statement library. The number of tracks required for the source statement library can be calculated as follows:

1. Determine the number of statements (N) used to define a book. If the book is an edited macro definition produced by the assembler, determine the number of statements in the source format definition.

2. Determine the average compressed statement length (Ls) in the book. The compressed statement length approximately equals:

   $$Ls = (L1+1) + \ldots + (Ln+1) + 3$$

   where each Ln is the number of bytes in each word of the source statement. For the macro sublibrary (sublibrary E) multiply the result by 1.2.

3. Determine the number of blocks (Bn) needed to hold the book:

   $$Bn = \frac{N(Ls)}{160}$$

   The value Bn is rounded to the next higher integer if a remainder results.

4. Determine the total number of blocks (Bt) required to hold all books in the library:

   $$Bt = B1 + B2 + B3 + \ldots + Bn$$

5. Determine the number of tracks (TSL) required to hold all of the books in the source statement library:

   $$TSL = \frac{Bt}{n}$$

   where n = 27 for the 2314/2319
             44 for the 3330/3333
             26 for the 3340

   The value TSL is rounded to the next higher integer if a remainder results.

6. Determine the number of cylinders (CSL) required to hold the source statement library and source statement directory:

   $$CSL = \frac{TSL+TSD}{n}$$

   where n = 20 for the 2314/2319
             19 for the 3330/3333
             12 for the 3340

   The value CSL is rounded to the next higher integer if a remainder results.

PROCEDURE LIBRARY SIZE

Each track allocated to the procedure library contains 40 fixed-length blocks for the 2314/2319, 61 fixed-length blocks for the 3330/3333, or 34 fixed-length blocks for the 3340. Each block is 80 bytes long. A cataloged procedure consists of one or more consecutive blocks, each containing a control statement or data, in uncompressed card-image format. The first five blocks of the procedure library are save areas for currently uninterpreted overwrite statements (1 block/partition) that have already been read. The number of tracks required for the procedure library can be calculated as follows:

1. Determine the number of blocks (B) for a procedure:

   B = N

   where N is the number of control statements and data cards in the procedure.

2. Determine the total number of blocks (Bt) required to hold all the procedures in the library, and add 5 for the save areas:

   Bt = B1 + B2 + B3 +.... Bn + 5

3. Determine the number of tracks (TPL) required to hold all the procedure library:

   $$TPL = \frac{Bt}{n}$$

   where n = 40 for the 2314/2319
   61 for the 3330/3333
   34 for the 3340

   The value of TPL is rounded to the next higher integer if a remainder results.

4. Determine the number of cylinders (CPL) required to hold the procedure library and procedure directory:

   $$CPL = \frac{TPD+TPL}{n}$$

   where n = 20 for the 2314/2319
   19 for the 3330/3333
   12 for the 3340

   The value of CPL is rounded to the next higher integer if a remainder results.

GENERAL CONTROL STATEMENT FORMAT

The librarian control statements are similar in format to statements processed by the assembler. The operation field must be preceded by one or more blanks. The operation field must begin to the right of column 1 and must be separated from the operand field by at least one blank position. The operand field is terminated by the first blank position. It cannot extend past column 71. Continuation statements are not recognized.

MAINTENANCE PROGRAM

This section describes the control statements that can be submitted to the MAINT program, which maintains the core image, relocatable, source statement, and procedure libraries. Except for the reallocation function of MAINT, all control statements apply to both system and private libraries; the reallocation function, however, cannot be used for private libraries.

To invoke the maintenance program, use the following job control statement:

```
// EXEC MAINT
```

One or more of the maintenance functions for one or more of the libraries can be requested within a single run:

- catalog
- delete
- rename
- condense
- reallocate
- update

Any number of phases, modules, books, or procedures can be acted upon in one run.

Note: If POWER or any unending job is started with a cataloged procedure, no maintenance functions can be performed on the procedure library as long as the job is active.

The following symbolic units must be assigned to perform maintenance functions on a private library: SYSCLB for a private core image library, SYSRLB for a private relocatable library, and SYSSLB for a private source statement library. A private library must be unassigned to perform maintenance functions on the corresponding system libraries.

CATALOG

The catalog function, which adds elements to a library, is described in the following sections:

CATALR -- to catalog to the relocatable library

CATALS -- to catalog to the source statement library

CATALP -- to catalog to the procedure library.

Note: To catalog to the core image library, refer to the chapter Linkage Editor.

CATALR

The CATALR control statement is used to add a module to the relocatable library. The CATALR control statement is read from the device assigned to SYSIPT and is in the following format:

```
CATALR modulename[,v.m]
```

The operation field contains CATALR. The entry in the operand field, *modulename*, is the name by which the module is to be known to the control system. The *modulename* is one to eight characters, the first of which must not be an asterisk.

The optional entry in the operand field, v.m, specifies the change level at which the module is to be cataloged. *v* may be any decimal number from 0-127. *m* may be any decimal number from 0-255. If this operand is omitted, a change level of 0.0 is assumed.

A change level can be assigned only when a module is cataloged. The change level is displayed and punched by the service functions.

The statements composing the input for a module are described in the *Linkage Editor* section. The statements are:

1. PHASE
2. INCLUDE control statement (if appropriate)
3. ESD
4. TXT
5. RLD
6. REP
7. END
8. ENTRY

These statements are read from the device assigned to SYSIPT. All input is diagnosed by the linkage editor. The CATALR statement is recognized but ignored by the linkage editor. The END statement indicates end of module.

The ENTRY statement can only be used in a module that contains only linkage editor control statements and an END statement. The ENTRY statement must be the last control statement in the module, following the END statement.

Normally, modules in the relocatable library are output from a language translator. However, you can construct an artificial module of linkage editor control statements, referred to as a *calling module*. The following example illustrates a valid calling module:

```
PHASE PHNAM1,ROOT
INCLUDE MODULE1
PHASE PHNAM2,*
INCLUDE MODULE2
PHASE PHNAM3,PHNAM2
      .
      .
      .
ENTRY CSECTNME
END
```

Operands in INCLUDE statements refer to modules in the relocatable library. If, for example, the preceding calling module is cataloged by the name BIGPROG, all modules referred to in BIGPROG can be link-edited by using the following control statements:

```
// OPTION CATAL
   INCLUDE BIGPROG
// EXEC LNKEDT
```

A calling module may consist only of INCLUDE statements. In this case, the PHASE statements would precede the included modules.

A ninth statement, SYM, can be in the linkage editor input. When recognized, however, it is bypassed by the linkage editor. (The SYM statement identifies the symbol table output by the assembler as a result of specifying SYM in the OPTION statement).

For the catalog function, SYSIN must be assigned to a card reader, a tape unit, a disk unit, or a 3540 diskette. SYSLST must be assigned to a printer, a tape unit, a disk unit, or a 3540 diskette, and SYSLOG must not be assigned to a printer. If SYSIN is assigned to a tape unit, the MAINT program assumes that the tape is positioned to the first input record. The tape is not rewound at the end of job.

Any number of modules can be cataloged in a single run. Each module must immediately follow its respective CATALR control statement.

An additional capability of the system allows for assembling or compiling a program and cataloging it to a relocatable library in one continuous run. This is done by inserting a CATALR statement in the job control input stream preceding the phase statement (if present) and the assembler/compiler execute statement. The CATALR statement is written on the SYSPCH file, if SYSPCH is assigned, (on tape, DASD, or 3540 diskette) ahead of the assembler/compiler output. Then reassign the SYSPCH file as SYSIPT and execute the MAINT program to perform the catalog function. The output of the assembly/compilation (on tape or DASD, or 3540 diskette) may be cataloged immediately or it may be cataloged at some later time. It can also be held after cataloging as backup of the assembly/compilation.

CATALS

The CATALS control statement is used to add a book to a sublibrary of the source statement library. It is read from the device assigned to SYSIPT and is in the following format.

```
CATALS sublib.bookname[,v.m[,C]]
```

The operation field contains CATALS. The qualifier sublib in the operand field represents the sublibrary to which the book is to be cataloged and can be any alphameric character (0-9, A-Z, #, $, and @), representing source statement sublibraries.

The sublib qualifier is required. If omitted, the operand is flagged as invalid and no processing is done on the book.

bookname in the operand field represents the name of the book to be cataloged. The bookname is one to eight alphameric characters, the first of which must be alphabetic (A-Z, #, $, and @).

The first optional entry in the operand field, v.m, specifies the change level at which the book is to be cataloged. v may be any decimal number from 0-127. m may be any decimal number from 0-255. If this operand is omitted, a change level of 0.0 is assumed. The change level is displayed and punched by the service functions.

The second optional entry in the operand field, C, indicates that change level verification is required before updates are accepted for this book, providing the v.m operand is present on the update card (see UPDATE librarian control statement). This requirement is reflected in the DSERV output by a C appearing in the column headed LEV CHK (level check).

Books that are to be cataloged in a sublibrary of the source statement library must be preceded and followed by special statements indicating the beginning and the end of a book.

Macro definitions that are to be cataloged in the assembler sublibrary are preceded by the MACRO statement and are followed by the MEND statement. MACRO is the standard macro definition header statement; MEND is the standard macro definition trailer statement.

When books to be retrieved by the assembler COPY statement are to be cataloged to the assembler sublibrary, the assembler END statement should not be included in the book. (Assembler does not recognize END statements from the source statement library.)

Books other than macro definitions that are to be cataloged in the source statement library are preceded and followed by a BKEND statement. A BKEND statement must precede each book, and a BKEND statement must follow each book. If desired, the BKEND statement may precede and follow a macro definition (in addition to the MACRO and MEND statements). This is desirable when the options provided in the BKEND statement are required. The statement is in the following format.

```
BKEND [sub.book],[seq-chk],[count],[CMPRSD]
```

The entry in the operation field is BKEND. All operand entries are optional. When used, the entries must be in the prescribed order, and need appear only in the BKEND statement preceding the book to be cataloged. The first entry in the operand field, sub.book, is identical to the operand of the CATALS control statement. The second operand seq-chk specifies that sequence checking is required. Which columns will be checked depends on how this operand is specified. Columns 73-78 will be checked if SEQNFS is specified. Columns 77-80 will be checked if SEQNCE is specified. The count operand specifies the number of card images in the book. When used, the card input is counted, beginning with the preceding BKEND statement and including the following BKEND statement. If an error is detected in either the sequence checking or the card count, an error message is printed. The error can be corrected, and the book can be recataloged. The CMPRSD operand indicates that the book to be cataloged in the library is in the compressed format, output as a result of specifying CMPRSD when performing a PUNCH or DSPCH service function.

For the catalog function, SYSIN must be assigned to a card reader, tape unit, or disk unit, or a 3540 diskette. SYSIPT must be assigned to a card reader, a tape unit, a disk unit, or a 3540 diskette. SYSLST must be assigned to a printer, a tape unit, or a disk unit, and SYSLOG must not be assigned to a printer.

Any number of books may be cataloged in a single run. Each book must immediately follow its respective CATALS control. The function can also delete an entire sublibrary or an entire library.

CATALP

The CATALP control statement is used to add a procedure to the procedure library. Any number of procedures may be cataloged in a single run. Each procedure must immediately follow the respective CATALP statement.

Statement Format:

```
CATALP procedurename [,VM=v.m][,EOP=yy]
      [,DATA= NO ]
             YES
```

Each control statement in the procedure library should have a unique identity. This identity is required if you want to modify the job stream at execution time. Therefore, when cataloging, identify each control statement in columns 73-79 (blanks may be embedded).

procedurename
: represents the name of the procedure to be cataloged. The procedurename consists of one to eight alphameric characters.

  Procedurenames can be related to the partition in which the procedure is intended to be run. A partition-related procedurename must follow these conventions:

  $B for the BG partition
  $1 for the F1 partition
  $2 for the F2 partition
  $3 for the F3 partition
  $4 for the F4 partition.

  The procedurename must not begin with $$ or ALL.

VM=v,m
: specified the change level at which the procedure is to be cataloged. v may be any decimal number from 0-127. m may be any decimal number from 0-255. If this operand is omitted, a change level of 0.0 is assumed.

  A change level can be assigned only when a procedure is cataloged. The change level is displayed and punched by the service functions.

EOP=yy
: specifies a two-character end-of-procedure delimiter. The EOP parameter can be any combination of characters except /*, /&, //; it must not contain a blank or a comma. The system assumes /+ as default end-of-procedure delimiter. Otherwise you can omit the EOP parameter.

DATA=YES
: specifies that a procedure contains SYSIPT inline data. These procedures can only be executed in the extended procedure support.

A procedure to be cataloged into the procedure library may consist of job control and linkage editor statements and, if the supervisor was generated with the SYSFIL option, any additional SYSIPT data which must be processed under control of a device-independent sequential IOCS module (for instance, control statements for utility programs and service programs, source statements for compilers and object modules for the linkage editor). The end of a procedure is indicated by the /+ end-of-procedure delimiter or by the end-of-procedure delimiter as specified in the EOP parameter.

For the catalog function, SYSIN must be assigned to a card reader, a tape unit, a disk unit, or a 3540 diskette. SYSLST must be assigned to a printer, a tape unit, a disk unit, or a 3540 diskette, and SYSLOG must not be assigned to a printer. If SYSIN is assigned to a tape unit, the MAINT program assumes that the tape is positioned to the first input record. The tape is not rewound at end of job.

A sample job stream follows.

```
// JOB CATPROC
   .
   .
   ASSGN control statement,
   if required
   .
   .
// EXEC MAINT
   CATALP PROCA,EOP=/$,DATA=YES
   .
   .
   control statements
   .
   .
   SYSIPT inline data
   .
   .
/* END OF SYSIPT DATA
   .
   .
   control statements
   .
   .
/$ END OF PROCEDURE
/&
```

The following restrictions apply when you catalog procedures to the procedure library:

1. A cataloged procedure cannot contain control statements or SYSIPT data for more than one job.

2. If the cataloged control statements include the JOB statement, you must not have a JOB statement when you retrieve the procedure through the EXEC statement. Conversely, if the JOB statement is not cataloged, a JOB statement must precede the EXEC statement that retrieves the procedure.

3. A cataloged procedure must not include any of the following control statements because they are not accepted when the procedure is processed:

```
// ASSGN SYSRDR,X'cuu'
// RESET SYS
// RESET ALL
// RESET SYSRDR
// CLOSE SYSRDR,X'cuu'
// ASSGN SYSIPT,X'cuu'
// RESET SYSIPT  only if SYSIPT data is
   included.
// CLOSE SYSIPT,X'cuu'
```

4. Cataloged procedures cannot be nested, that is, a cataloged procedure cannot contain an EXEC statement that invokes another cataloged procedure.

DELETE

The delete function, which removes references to specific elements of a library, is described in the following sections:

DELETC -- to delete from the core image library

DELETR -- to delete from the relocatable library

DELETS -- to delete from the source statement library

DELETP -- to delete from the procedure library.

DELETC

The DELETC control statement in one of the following formats is used to delete phases or programs from the core image library.

```
DELETC phasename1[,phasename2,...]

DELETC prog1.ALL[,prog2.ALL,...]
```

In the first format, the entry in the operation field is DELETC. phasename in the operand field represents the name(s) of the phase(s) to be deleted. The name of the phase may be a maximum of eight characters. Entries in the operand field must be separated by commas.

In the second format, prog refers to the first four characters of the program name. (All phases within a program have the same first four characters. Therefore, the first four characters of each program within the library should be unique.) The four characters are followed by a period and ALL.

Any number of DELETC control statements can be used for the core image library within a single run.

For the delete function, SYSIN must be assigned to a card reader, a tape unit, a disk unit, or a 3540 diskette. SYSLST must be assigned to a printer, a tape unit, a disk unit, or a 3540 diskette, and SYSLOG must not be assigned to a printer.

DELETR

The DELETR control statement in one of the following formats is used to delete a module from the relocatable library.

```
DELETR modname[,modname,...]

DELETR prog1.ALL[,prog2.ALL,...]

DELETR ALL
```

The first format is used when a specific module is to be deleted, and must always be used when deleting DIMODs. The entry in the operation field is DELETR. The entry in the operand field, modname, is the name of the module to be deleted. If more than one module is to be deleted, the module names are separated by a comma. modname is one to eight characters, the first of which must not be an asterisk.

The second format is used when an entire program is to be deleted. The entry in the operation field is DELETR. In the operand field, prog refers to the first three characters of the modules used to build the program. (All IBM-supplied modules in the relocatable library making up a program have the same first three characters, such as IJQ for the assembler and IJS for COBOL.) The three characters are followed by a period and ALL.

The third format is used if the entire library is to be deleted. The entry in the operation field is DELETR. The entry in the operand field is ALL. When this function is performed, the system status record is reset to show that all library blocks are now available to the system. Therefore, it is unnecessary to perform a condense function after a DELETR ALL has been performed.

Any number of DELETR control statements can be used for the relocatable library within a single run.

For the delete function, SYSIN must be assigned to a card reader, a tape unit, a disk unit, or a 3540 diskette. SYSLST must be assigned to a printer, a tape unit, a disk unit, or a 3540 diskette, and SYSLOG must not be assigned to a printer.

DELETS

The DELETS control statement is used to delete books from the source statement library. The control statement is in one of the following formats.

```
DELETS sublib.book1[,sublib.book2,...]

DELETS sublib.ALL

DELETS ALL
```

The first format is used if only specific books are to be deleted. The entry in the operation field is DELETS. The qualifier sublib in the operand field represents the sublibrary containing the book to be deleted and can be any alphameric character (0-9, A-Z, #, $, and @), representing source statement sublibraries.

The sublib qualifier is required. If omitted, the operand is flagged as invalid and no processing is done on the book.

book in the operand field represents the name of the book in the sublibrary to be deleted. If more than one book is to be deleted, the entries must be separated by commas. If books to be deleted are in the same sublibrary, subsequent book names need not be qualified. (The librarian assumes that nonqualified books are in the last sublibrary specified.) The name of the book can be of any length; however, a maximum of the first eight characters is used to locate and delete the book. Continuation statements are not recognized.

The second format is used if an entire sublibrary is to be deleted. The entry in the operation field is DELETS. The first entry in the operand field is the name of the sublibrary to be deleted. The qualifier sublib represents the sublibrary containing the book to be deleted and can be any alphameric character (0-9, A-Z, #, $, and @), representing source statement sublibraries.

The sublib qualifier is required. If omitted, the operand is flagged as invalid and no processing is done on the sublibrary.

The second entry in the operand field is ALL. The two entries must be separated by a period.

The third format is used if the entire source statement library is to be deleted. The entry in the operation field is DELETS. The entry in the operand field is ALL. When this function is performed, the system status record is reset to show that all library blocks are now available to the system. Therefore, it is unnecessary to perform a condense after a DELETS ALL has been performed.

For the delete function, SYSIN must be assigned to a card reader, a tape unit, a disk unit, or a 3540 diskette. SYSLST must be assigned to a printer, a tape unit, a disk unit, or a 3540 diskette, and SYSLOG must not be assigned to a printer.

DELETP

The DELETP control statement in one of the following formats is used to delete a procedure from the procedure library:

```
{DELETP procedurename[,procedurename,...]}
{DELETP ALL                              }
```

procedurename
: specifies the name of the procedure to be deleted. If more than one procedure is to be deleted, the names are separated by commas. The procedure name is one to eight alphameric characters, the first of which must be alphabetic or $.

ALL
: specifies that the entire library is to be deleted. After a DELETP ALL has been performed, the system status record is reset to show that all library blocks are now available to the system. Therefore, it is unnecessary to perform a condense function after a DELETP ALL has been performed.

Any number of DELETP control statements can be used for the procedure library within a single run.

For the delete function, SYSIN must be assigned to a card reader, a tape unit, a disk unit, or a 3540 diskette. SYSLST must be assigned to a printer, a tape unit, a disk unit, or a 3540 diskette, and SYSLOG must not be assigned to a printer.

RENAME

The rename function, which changes the name of an element in a library, is described in the following sections:

RENAMC -- to rename a phase in the core image library

RENAMR -- to rename a module in the relocatable library

RENAMS -- to rename a book in the source statement library

RENAMP -- to rename a procedure in the procedure library.

RENAMC

The RENAMC control statement is used to change the name of a phase in the core image library to another name. If the new name is already in the directory or an old name is not in the directory, an error message is issued. On a valid pair of operands, the new name simply replaces the old name in the directory; the version and modification levels are not changed. In either case, a check is then made for more operands on the card. As soon as the /& statement is processed, only the new phase names exist in the directory. The RENAMC statement is in the following format.

RENAMC oldname,newname[,oldname,newname,..]

The operation field contains RENAMC. The operand field entries, oldname and newname, represent the old phase name and the new phase name. The two entries in the operand field must be separated by a comma. The names in the operand field may be a maximum of eight characters. Note: ALL is an invalid phase name.

Any number of RENAMC control statements can be used for the core image library within a single run.

For the rename function, SYSIN must be assigned to a card reader, a tape unit, a disk unit, or a 3540 diskette. SYSLST must be assigned to a printer, a tape unit, a disk unit, or a 3540 diskette, and SYSLOG must not be assigned to a printer.

RENAMR

The RENAMR control statement is used to change the name of a module in the relocatable library to another name. If the new name is already in the directory or an old name is not in the directory, an error message is issued. On a valid pair of operands, the new name simply replaces the old name in the directory; the version and modification levels are not changed. In either case, a check is then made for more operands on the card. As soon as the statement is processed, the system recognizes only the new module name. The RENAMR statement is in the following format:

RENAMR oldname,newname[,oldname,newname,..]

The operation field contains RENAMR. The entries in the operand field, oldname and newname, represent the old module-name and the new module-name, respectively, and are separated by a comma. oldname and newname are one to eight characters, the first of which must not be an asterisk.

Any number of RENAMR control statements can be used for the relocatable library within a single run.

For the rename function, SYSIN must be assigned to a card reader, a tape unit, a disk unit, or a 3540 diskette. SYSLST must be assigned to a printer, a tape unit, a disk unit, or a 3540 diskette, and SYSLOG must not be assigned to a printer.

RENAMS

The RENAMS control statement is used to change the name of a book in the source statement library to another name. If the new name is already in the directory or an old name is not in the directory, an error message is issued. On a valid pair of operands, the new name simply replaces the old name in the directory; the version and modification levels are not changed. In either case, a check is then made for more operands on the card. As soon as the statement is processed, the system recognizes only the new book name. The RENAMS statement is in the following format.

RENAMS sublib.oldname,sublib.newname
[,sublib.oldname,sublib.newname,...]

The operation field contains RENAMS. The qualifier sublib in the operand field represents the sublibrary containing the book to be renamed and can be any alphameric character (0-9, A-Z, #, $, and @), representing source statement sublibraries.

The sublib qualifier is required. If omitted, the operand is flagged as invalid and no processing is done on the sublibrary.

oldname and newname represent the old book name and the new book name. If newname is omitted, the name is assumed to be the same as for the oldname. The entries in the operand field must be separated by commas. The names in the operand field can be of any length; however, only a maximum of the first eight characters is used by the system to locate and rename the book.

The DOS/VS assemblers flag any reference to a macro in the source statement library as an UNDEFINED OPERATION CODE if the cataloged name of the macro is not identical to the operation code in the macro prototype statement. The assemblers locate macros in the source statement library by the cataloged name, but thereafter use the operation code of the macro prototype statement for identification.

Any number of RENAMS control statements can be used for the source statement library within a single run.

For the rename function, SYSIN must be assigned to a card reader, a tape unit, a disk unit, or a 3540 diskette. SYSLST must be assigned to a printer, a tape unit, a disk unit, or a 3540 diskette, and SYSLOG must not be assigned to a printer.

RENAMP

The RENAMP control statement is used to change the name of a procedure in the procedure library to another name. If the new name is already in the directory or an old name is not in the directory, an error message is issued. On a valid pair of operands, the new name simply replaces the old name in the directory; the version and modification levels are not changed. In either case, a check is then made for more operands on the card. As soon as the statement is processed, the system recognizes only the new module name. The RENAMP statement is in the following format:

```
RENAMP
oldname,newname[,oldname,newname,...]
```

oldname, newname — represent the old procedure name followed by the new procedure name. The procedure names are from one to eight alphameric characters, the first of which must be alphabetic or $. They must not be ALL.

Any number of RENAMP control statements can be used for the procedure library within a single run.

For the rename function, SYSIN must be assigned to a card reader, a tape unit, a disk unit, or a 3540 diskette. SYSLST must be assigned to a printer, a tape unit, a disk unit, or a 3540 diskette, and SYSLOG must not be assigned to a printer.

CONDENSE

The condense function eliminates vacancies, resulting from delete or catalog functions. The condense function is used when a number of vacancies have accumulated within the library. Condense can be requested via one of two control statements:

CONDS -- condenses any or all of the libraries when issued

CONDL -- condenses any or all of the libraries automatically when a specified limit is reached.

CONDS

The CONDS control statement, in the following format, is used to condense the core image library:

```
CONDS CL
```

The operation field contains CONDS. The operand field contains CL. The relocatable library, the source statement library, and/or the procedure library can also be condensed in this run. If this is desired, the entry RL (for the relocatable library), SL (for the source statement library), and PL (for the procedure library) can appear in the operand field. Multiple entries in the operand field are separated by commas.

The CONDS statement, in the following format, is used to condense the relocatable library:

```
CONDS RL
```

The CONDS statement, in the following format, is used to condense the source statement library:

```
CONDS SL
```

The CONDS statement, in the following format, is used to condense the procedure library:

```
CONDS PL
```

For the condense function, SYSIN must be assigned to a card reader, a tape unit, a disk unit, or a 3540 diskette. SYSLST must be assigned to a printer, a tape unit, a disk unit, or a 3540 diskette, SYSLOG must not be assigned to a printer.

CONDL

The condense maintenance function can be performed automatically at the end of a catalog or delete maintenance function under the control of an installation specified parameter. The parameter is stored in the system directory. It indicates that when the number of blocks available in the corresponding library is less than the number specified by the parameter, and at least one directory entry is deleted, the condense function is performed for that library. The system interrogates the parameter at the completion of each maintenance function for the library. If a condense function is to be performed, a message appears on SYSLOG to inform the operator that the library is to be condensed. If a private core image library is assigned to more than one partition, the condense is not performed. If multiprogramming is in progress, the auto-condense is ignored for any library except a private core image library. Also, if condense (CONDS) is specified when MAINT is executed and a private core image library is assigned to a foreground partition, the condense is not performed.

The CONDL control statement (as opposed to the CONDS control statement for a user-specified condense function) informs the MAINT librarian program that a parameter to specify an automatic condense is to be set. The CONDL control statement is in the following format.

```
CONDL lib=nnnnn[,lib=nnnnn,...]
```

In the operand field, the entry lib is CL for the core image library, RL for the relocatable library, SL for the source statement library, and PL for the procedure library. The entry nnnnn represents the number of blocks specified for the specific library and is from one to five decimal digits. The maximum value of nnnnn is 65536. Each track of the core image library contains 3 blocks on the 2311 (private core image library only), 6 blocks on the 2314/2319, 11 blocks on the 3330/3333, or 7 blocks on the 3340. Each track of the relocatable library contains 16 blocks on the 2314/2319, 28 blocks on the 3330/3333, or 17 blocks on the 3340. Each track of the source statement library contains 27 blocks on the 2314/2319, 44 blocks on the 3330/3333, or 26 blocks on the 3340. Each track of the procedure library contains 40 blocks on the 2314/2319, 61 blocks on the 3330/3333, or 34 blocks on the 3340.

If 0 (zero) is specified for nnnnn, an automatic condense is not performed for the specific library. If the number of blocks specified exceeds the number of blocks allocated for the library, a condense is performed each time deleted blocks appear in the library at the end of a maintenance function. When the system is copied onto another pack, the condense limit on SYSRES is set to zero.

The automatic condense of the core image library is bypassed when a new supervisor is cataloged.

The condense limits are displayed with the system status on a DSERV and at the end of a maintenance job.

The control statement input to establish a value for an automatic condense is the same as that for a user-specified condense. See the section CONDS for a description of the control statement input.

REALLOCATE

The reallocation function redefines the number of tracks and cylinders allotted to a disk-resident system.

The EXEC control statement required to perform a reallocation function is in the following format:

```
// EXEC MAINT
```

Associated with the EXEC statement for the reallocation function is the ALLOC control statement. The ALLOC control statement is in the following format:

```
ALLOC CL=cylin(tracks),RL=cylin(tracks),
      SL=cylin(tracks),PL=cylin(tracks)
```

The operation field contains ALLOC. The operand field contains a sequence of letter combinations and cylin(tracks). The library identifiers are as follows:

CL = core image library and directory
RL = relocatable library and directory
SL = source statement library and directory
PL = procedure library and directory.

All operands of the ALLOC statement are required. If a specific library is not present, an allocation of 0(0) must be supplied.

The entry, cylin, in the operand field refers to the number of cylinders that contain the specified library. The entry, track, is enclosed within parentheses and refers to the number of tracks that contain the specified library directory. The tracks allocated to the directory are contained in the cylinders allocated to the

library. The keyword operands are separated by a comma if more than one operand is present. For maximum efficiency, all requested operands should be entered on one statement.

For the reallocation function, SYSIN must be assigned to a card reader, a tape unit, a disk unit, or a 3540 diskette. SYSLST must be assigned to a printer, a tape unit, or a disk unit, or a 3540 diskette, and SYSLOG must not be assigned to a printer.

If message 4n44A comes up due to a change in the label set when reallocating SYSRES, type DELETE on SYSLOG. The job continues using new extents.

UPDATE

The update function updates properly identified statements within a book of a source statement library.

The UPDATE control statement has the following format:

```
UPDATE sublib.bookname,[s.book1],[v.m],[nn]
```

The operation field contains UPDATE.

sublib in the operand field represents the sublibrary that contains the book to be updated. It may be any of the characters A-Z, 0-9, $, @, or #.

bookname represents the book that is to be updated in the sublibrary.

s.book1 in the operand field provides a temporary update option. The old book is renamed s.book1 and the updated book is named sublib.bookname. s indicates the sublibrary that contains the old, renamed book. It may be one of the characters A-Z, 0-9, $, @, or #. If this operand is not specified, the old book is deleted.

v.m represents the change level of the book to be updated. v may be any decimal number from 0-127. m may be any decimal number from 0-255. This operand must be present if change level verification is to be done, and it must correspond to the change level in the book's directory entry. If the change level is verified, the change level in the book's directory entry is increased by 1 for verification of the next update. If m is at its maximum value and an update is processed, m is reset to 0 and the value of v is increased by 1.

If both v and m are at their maximum values and an update is processed, both v and m are reset to zeros. If the directory entry specifies that change level verification is not required before updating, the change level operand in the statement is ignored. Use of the optional entry C in the CATALS control statement at the time the book is cataloged to the library determines if change level verification is required before updating.

nn in the operand field represents the resequencing status required for the update. nn may be a one- or two-character decimal number from 1-10, or it may be the characters FS or the word NO. If nn is a decimal number, it represents the increment that will be used in resequencing the statements in the book. For books supplied by IBM since Release 28, nn must be FS (fixed sequence). When nn is FS, no resequencing can be performed. If nn is NO, the statements will not be resequenced. If nn is not specified, the statements will be resequenced with an increment of 1. When a book is resequenced, the sequence number of the first statement is padded with zeros.

Note: See the section CATALS for additional information about sequence numbering books in a source statement library.

The UPDATE control statement is followed by ADD, DEL (delete), and/or REP (replace) control statements as required. Each ADD or REP statement is followed by source statements that are to be added to the book. The update section is terminated by an END statement. The ADD, DEL, REP, and END statements are identified as update control statements by a right parenthesis in the first position (column 1 in card format). The second position is blank. This is a variation from the general librarian control statement format, but it clearly identifies these control statements as part of the update function.

ADD Statement

The ADD statement is used for the addition of source statements to a book. The format is:

```
) ADD seq-no
```

ADD indicates that source statements following this statement are to be added to the book.

seq-no represents the sequence number of the statement in the book after which the new statements are to be added. It may be any decimal number from one to four characters in length (columns 77-80). If FS was specified in the UPDATE control statement, seq-no may be any decimal number from one to six characters in length (columns 73-78). (Columns 79-80 of

IBM-supplied books contain the release number.) If FS was specified, also note that the seq-no of the first and only the first) ADD statement may be zero. In this case, the source statements that follow are added in front of the first source statements of the book (provided that their sequence numbers are lower than those of the first source statements in the book).

DEL Statement

The DEL statement causes the deletion of source statements from the book. The format is:

) DEL first-seq-no[,last-seq-no]

DEL indicates that statements are to be deleted from the book.

first-seq-no and last-seq-no represent the sequence numbers of the first and last statements of a section to be deleted. Each number may be any decimal number from one to four characters in length (columns 77-80). If FS was specified in the UPDATE control statement, each number may be any decimal number from one to six characters in length (columns 73-78). Note: The first-seq-no must not be zero. If last-seq-no is not specified, the statement represented by first-seq-no is the only statement deleted.

To delete an entire book, use the DELETS function.

REP Statement

The REP statement is used when replacement of source statements in a book is required. The format is:

) REP first-seq-no[,last-seq-no]

This indicates that source statements following the REP statement are to replace existing source statements in a book.

first-seq-no and last-seq-no represent the sequence numbers of the first and last statements of a section to be replaced. Each number may be a decimal number from one to four characters in length (columns 77-80). If FS was specified in the UPDATE control statement, each number may be any decimal number from one to six characters in length (columns 73-78). Note: The first-seq-no must not be zero. Any number of new statements can be added to a book when a section is replaced. (The number of statements added need not equal the number of statements being replaced.)

To replace an entire book, use the DELETS and CATALS functions.

If FS was not specified in the UPDATE control statement, sequence number 9999 is the highest number acceptable for a statement to be updated. If the book is so large that statement sequence numbers have wrapped around to zeros, it is not possible to update.

If FS was specified in the UPDATE control statement, 999999 is the maximum. In this case, 999999 need not be an actual sequence number. Specifying 999999 as the last-seq-no in)DEL or) REP cards indicates that the source statements beginning with the first-seq-no and up to and including the last source statement of the book are to be deleted or replaced.

If FS was specified in the UPDATE control statement, any source statement following the) ADD or) REP control statement should have the following format:

Columns

1-72 contain any user's source statement.

73-78 must contain a sequence number which must be greater than the sequence number after which it is inserted, and less than the subsequent sequence number.

79-80 may contain any character including blanks.

Note: If source code following) ADD or) REP contains blanks in columns 73-78, the sequence number of that source code will be defaulted to the previous sequence number plus one, and columns 79/80 will be filled in by **.

If FS was not specified in the UPDATE control statement, any source statement following the) ADD or) REP control statement should have the following format:

Columns

1-72 contain any user's source statement.

73-76 contain a program identifier.

77-80 may contain a sequence number. If used, each number must be greater than the sequence number after which it is inserted, and less than the subsequent sequence number.

Note: See the section CATALS for additional information about sequence numbering books in a source statement library.

END Statement

This statement indicates the end of an update to a book. The format is:

```
) END [v.m[,C]]
```

END indicates the end of updates to a book.

The v.m operand provides another means of explicitly setting the change level of a book in the library. (The other way is through the use of the v.m operand in the CATALS statement.) v may be any decimal number from 0-127. m may be any decimal number from 0-255.

C indicates that change level verification is required before any subsequent updates to this book.

If v.m is specified and C is omitted, the book does not require change level verification before a subsequent update. This feature removes a previously specified verification requirement for a particular book.

If both optional operands are omitted, and change level verification was required for this update, the change level in the book's directory entry is increased, as the result of the update, and the verification requirement remains unchanged.

UPDATE FUNCTION INVALID OPERAND DEFAULTS:

UPDATE Statement:

1. If the first or second operand is invalid, the statement is flagged, the book is not updated, and the remaining control statements are checked for validity.

2. If change level verification is required and the wrong change level is specified, the statement is flagged, the book is not updated, and the remaining control statements are checked for validity.

3. If the resequencing operand is invalid, resequencing is done in increments of 1. The job will be canceled if FS was required.

ADD, DEL, or REP Statements:

1. If there is an invalid operation or operand in an ADD, DEL, or REP statement, the statement is flagged, the book is not updated, and the remaining control statements are checked for validity. All options of the UPDATE and END statements are ignored.

2. The second operand must be greater than the first operand in a DEL or REP statement. If not, the statement is considered invalid, it is flagged, the book is not updated, and the remaining control statements are checked for validity. If a second operand is present on an ADD statement, it is flagged as an invalid operand and ignored. The book is updated and normal processing continues. All options of the UPDATE and END statements are ignored.

3. All updating to a book between an UPDATE statement and an END statement must be in ascending sequential order of statement sequence numbers. The first operand of a DEL or REP statement must be greater than the last operand of the preceding control statement. The operand of an ADD statement must be equal to or greater than the last operand of the preceding control statement. Consecutive ADD statements must not have the same operand. If these conditions are not met, the default is the same as for items 1 and 2.

END Statement: If the first operand of the END statement is invalid, the statement is flagged, both operands are ignored, and the book is updated as though no operands were present. If the second operand is invalid, the statement is flagged, the operand is ignored, and the book is updated as though the second operand was not specified.

Out-of-Sequence Updates: If FS was specified in the UPDATE control statement, the source statements to be added to a book must be in sequence; otherwise, the book is not updated and the remaining control statements are checked for validity. If the source statements to be added do not contain sequence numbers, the sequence number will be defaulted to the previous sequence number plus one, and columns 79-80 will be filled in by **.

If FS was not specified in the UPDATE control statement, and if the source statements to be added to a book are not in sequence, or do not contain sequence numbers, the book is updated and a message indicating the error appears following the END statement. If the resequencing option has been specified in the UPDATE statement, the book is sequenced by the specified value and subsequent updating is possible. If the resequencing option is not specified, the book is resequenced in increments of 1 and subsequent updating is possible. If the resequencing option NO is specified, the updated book is not in sequence and subsequent updating may not be possible.

For the update function, SYSIN must be assigned to a card reader, a tape unit, a disk unit, or a 3540 diskette. SYSLST must be assigned to a printer, a tape unit, a disk unit, or a 3540 diskette, and SYSLOG must not be assigned to a printer.

UPDATE Function - Activity Log: The UPDATE function provides a log, on SYSLST, of all update activity to books in the source statement library. The log indicates the operation performed and all operands of the update control statements. It also shows the contents of the source statements affected, including the old program identification and sequence number, the new program identification and sequence number, and the update activity involved. Figures 31 and 32 show examples of an UPDATE jcb stream and an UPDATE activity log, respectively.

If no resequencing has been specified, only the old ID and sequence numbers of the statements involved are indicated.

```
// JOB UPDATE
// EXEC MAINT
  UPDATE A.TESTCASE
) REP 0032
OPTNFND   CLC    0(1,REGG),BLANKS
) REP 0039,0044
OPTNCHK   CLC    0(5,REGG),=C'PUNCH'
          BE     PUNCH
          CLC    0(5,REGG),=C'DSPCH'
) ADD 0052
PUNCH     MVI    SWITCH,C'X'
          B      CHKOPND
) DEL 0134,0135
) END
/&
```

Figure 31. Example of an UPDATE Jcb Stream

```
UPDATE   A.TESTCASE

  ) REP 0032
     OPTNFND  CLI   0(REGG),C' '                    A4530032
     OPTNFND  CLC   0(1,REGG),BLANKS                A4530032   A4530027   REPLACEMENT

  ) REP 0039,0044
     OPTNCHK  CLC   0(5,REGG),PUNCHOP               A4530039
              BNE   CHKDSP                          A4530040
              MVI   SWITCH,C'X'                     A4530041
              B     CHKOPND                         A4530042
     CHKDSP   CLC   0(5,REGG),DSPCHOP               A4530043
              BNE   MSGLOG                          A4530044
     OPTNCHK  CLC   0(5,REGG),=C'PUNCH '            A4530039   A4530034   REPLACEMENT
              BE    PUNCH                           A4530040   A4530035   REPLACEMENT
              CLC   0(5,REGG),=C'DSPCH '            A4530041   A4530036   REPLACEMENT

  ) ADD 0052
              B     MSGLOG                          A4530052   A4530044   RESEQUENCED
     PUNCH    MVI   SWITCH,C'X'                     A4530053   A4530045   ADD
              B     CHKOPND                         A4530054   A4530046   ADD

  ) DEL 0134,0135
     DSPCHOP  DC    C'DSPCH '                       A4530134              DELETE
     PUNCHOP  DC    C'PUNCH '                       A4530135              DELETE

  ) END
```

Figure 32. Example of an UPDATE Activity Lcg

Example I

```
col. 1                                                    col. 73-80
// EXEC MAINT
   UPDATE Z.TESTBOOK,Z.SAVEBOOK,,FS
) ADD 24310
     CLC   SSEXTNT(4),ZERO          SSL ALLOCATED  024313AS
     BE    IGNORE                   NC             024316AS
) REP 25430
     BCT   WRKREG2,LOOP             LOOP TWICE     025430
) DEL 26210,26230
) END
/*
```

EXAMPLE OF AN UPDATE JOB STREAM FOR IBM-SUPPLIED BOOKS

A book in the sublibrary Z named TESTBOOK has to be updated temporarily. The old book is to be renamed: SAVEBOOK. Two statements are to be added after the source statement with sequence number (columns 73-78): 024310. One statement with sequence number 025430 is to be replaced. Three subsequent statements with sequence numbers: 26210, 26220, 26230 are to be deleted. The control statements are shown in Example I.

COPY PROGRAM

This section describes the control statements that can be submitted to the CORGZ program, which performs the following operations, individually or in combination:

1. Defines and/or creates a new system pack.
2. Defines and/or creates private libraries.
3. Transfers phases, modules, or books between any assigned libraries.

To invoke the CORGZ program, use job control statement:

```
// EXEC CORGZ
```

Associated with the EXEC statement are three independent copy control statements and five COPY statements. The three independent copy control statements are:

1. ALLOC statement. Defines the libraries on a new system resident pack. If this statement is omitted, or if any of the libraries is not allocated in the statement, the job is canceled. If no assignments for a particular library are to be made, the assignment should nevertheless be included with a zero allocation. A zero allocation is not possible for the system core image library. The directory allocation for the CIL is at least two tracks: one directory for cataloged phases and one directory for linked phases. (The first two tracks of the system residence file should be taken into account for the number of cylinders allocated to the SCIL. These two tracks are used by the system for IPL information and a system workarea.)

   The format of the ALLOC statement is identical to the ALLOC statement described earlier in the section Reallocate.

   To use the reallocated or newly created pack as system residence file, you must re-IPL this pack again.

2. NEWVOL statement (see the section Creation of Private Libraries). Defines private libraries.
3. MERGE statement (see the section Merge Function). Transfers data between libraries that were defined, or defined and created previously.

The following functions are performed automatically by the CORGZ program, when the ALLOC statement is used:

- All programs essential to a minimum system are copied. These programs are all logical and physical transients, IPL, supervisor, job control, and linkage editor.
- The partition and system standard labels are copied from the SYSRES label cylinder to the label cylinder on SYS002.
- Cylinder 0, track 0, records 1 and 2, and cylinder 0, track 1 are built.

COPY, ALL SYSTEM LIBRARIES

The COPY control statement copies the complete system, but can only be used when SYSRES contains all four libraries. The information copied into the new pack includes cylinder 0 (track 0, records 1 and 2, and track 1), the four libraries, the label cylinder, and the VTOC cylinder. It is in the following format:

COPY ALL

This statement is valid only when preceded by an ALLOC statement.

COPY, CORE IMAGE LIBRARY

The COPYC control statement is used to specify the phases or programs in the core image library that are to be copied. It is in one of the following formats.

COPYC phase1[,phase2,...]

COPYC prog1.ALL[,prog2.ALL,...]

COPYC ALL

The first format is used when specific phases are to be copied. The entry in the operation field is COPYC. The entry, phase, in the operand field represents the name(s) of the phase(s) to be copied. Entries in the operand field must be separated by commas.

The second format is used when specific programs are to be copied. The entry in the operation field is COPYC. The entry, prog.ALL, in the operand field represents the name of the program to be copied. prog is the first four characters of the program name. (All phases within a program have the same first four characters.) prog is followed by a period and ALL. Entries in the operand field must be separated by commas.

The third format is used to copy the complete core image library. The entry in the operation field is COPYC. The entry in the operand field is ALL.

COPY, RELOCATABLE LIBRARY

The COPYR control statement is used to specify the modules in the relocatable library that are to be copied. It is in one of the following formats.

COPYR module1[,module2,...]

COPYR prog1.ALL[,prog2.ALL,...]

COPYR ALL

The first format is used when specific modules are to be copied. The entry in the operand field is COPYR. The entry, module, in the operand field represents the name(s) of the module(s) to be copied. Entries in the operand field must be separated by commas.

The second format is used when specific programs are to be copied. The entry in the operation field is COPYR. The entry, prog, in the operand field represents the name of the program to be copied. prog is the first three characters of the program name. (All modules within an IBM-supplied program have the same first three characters, such as IJB for the supervisor and IJK for PL/I). prog is followed by a period and ALL. Entries in the operand field must be separated by commas.

The third format is used to copy the complete relocatable library. The entry in the operation field is COPYR. The entry in the operand field is ALL.

COPY, SOURCE STATEMENT LIBRARY

The COPYS control statement is used to specify the books in the source statement library that are to be copied. It is in one of the following formats.

COPYS sublib.book1[,sublib.book2,...]

COPYS sublib1.ALL[,sublib2.ALL,...]

COPYS ALL

The first format is used when specific books are to be copied. The entry in the operation field is COPYS. The qualifier sublib in the operand field represents the name of the sublibrary containing the book and can be an alphameric character (0-9, A-Z, #, $, and @), representing source statement sublibraries.

The sublib qualifier is required. If omitted, the operand is flagged as invalid and no processing is done on the book.

book represents the name(s) of the book(s) to be copied.

The second format is used when an entire sublibrary is to be copied. The entry in the operation field is COPYS. The entry, sublib, in the operand field represents the name of the sublibrary to be copied and can be any alphameric character (0-9, A-Z, #, $, and @), representing source statement sublibraries.

The sublib qualifier is required. If omitted, the operand is flagged as invalid and no processing is done on the sublibrary. The qualifier sublib is followed by a period and ALL.

The third format is used to copy the complete source statement library. The entry in the operation field is COPYS. The entry in the operand field is ALL.

COPY, PROCEDURE LIBRARY

The COPYP control statement is used to specify the procedures in the procedure library that are to be copied. It has the following format:

```
COPYP procedurename[,procedurename,...]
      ALL
```

procedurename specifies the name of the procedure to be copied. If more than one procedure is to be copied, the names must be separated by commas.

ALL specifies that the entire procedure library is to be copied.

COPY, IPL

The COPYI control statement is used to transfer the IPL Retrieval Program ($$A$IPL2) between the SYSRES and SYS002 (RES and NRS) volumes. It is in the following format.

```
COPYI $$A$IPL2
```

COPY CONSIDERATIONS

Each library that is to be selectively copied requires a separate group of control statements. Any number of elements of a particular library can be specified in one control statement. Continuation statements are not valid. All entries in the operand field must be separated by commas.

When executing the copy disk (CORGZ) function, a file must be defined for IJSYSRS on SYS002 via DLBL and EXTENT control statements. The filename on the DLBL statement must be IJSYSRS. The file identification portion of the DLBL statement can be as shown in the example of the copy function.

The lower extent for this file must be cylinder zero, track one, and the upper extent must include the label cylinder. The label cylinder is one cylinder reserved for label information, and is located on the cylinder immediately following the last library of the system. The total allocation must include cylinder 0, all defined system libraries, and the label cylinder.

Figure 33 shows an example of a valid job setup for the copy function.

For the copy function, SYSIN must be assigned to a card reader, a tape unit, a disk unit, or a 3540 diskette. SYS002 must be assigned to a disk unit. SYSLST must be assigned to a printer, a tape unit, a disk unit, or a 3540 diskette, and SYSLOG must not be assigned to a printer.

CREATION OF PRIVATE LIBRARIES

The COPY program can be used to create private libraries. SYS003 must be assigned if a private core image library is required. SYSRLB must be assigned if a private relocatable library is required. SYSSLB must be assigned if a private source statement library is required.

When creating a private library using CORGZ, a file must be defined for IJSYSPC on SYS003 and/or IJSYSRL on SYSRLB and/or IJSYSSL on SYSSLB. IJSYSPC, IJSYSRL, and IJSYSSL are the respective file names used in the creation of private core image, relocatable, and source statement libraries.

```
// JOB    COPY
// ASSGN  SYS002,X'191'
// DLBL   IJSYSRS,'DOS/VS SYSTEM RESIDENCE FILE',99/365,SD
// EXTENT SYS002,111111,1,000,00001,02519
// EXEC   CORGZ
   ALLOC  CL=60(10),RL=30(10),SI=30(10),PI=5(5)
   COPY   ALL
/*
/&
```

Figure 33. Example of a Valid Job Setup for the Copy Function

Creation of a private library is requested by the NEWVOL control statement. Its format follows.

```
NEWVOL id=cylin(track)[,id=cylin(track)]
```

id — Indicates the specific library and directory to be created and can be:

- CL for a private core image library and directory
- RL for a private relocatable library and directory
- SL for a private source statement library and directory.

cylin — Indicates the number of cylinders to contain the specified library.

track — Indicates the number of tracks to contain the specified library directory. The tracks allocated to the directory are contained within the cylinders allocated to the library. The difference between the number of cylinders for the library and the number of tracks for the library directory has to be at least 5 tracks.

The COPY program also provides the ability to copy all or part of the system core image and/or relocatable and/or source statement library into its respective private library. If this facility is to be used, it must be employed in the same job step in which the private library is created. This is done by inserting COPYC and/or COPYR and/or COPYS statements immediately behind the NEWVOL statement(s) in the job stream.

To define and create a private library from an existing private library, the MERGE statement must be used between the NEWVOL and the COPYR and/or COPYS statements (This does not apply for the COPYC statement). Below is an example of the sequence of steps.

```
// EXEC CORGZ
   NEWVOL RL=10(2),SL=10(1)
   MERGE PRV,PRV
   COPYR ALL
   COPYS ALL
/*
/&
```

The following precautions should be observed.

1. When a NEWVOL statement and a COPYC and/or a COPYR and/or a COPYS statement are both present, the NEWVOL statement must precede the COPYC, COPYR or COPYS statement.
2. The creation of a new system residence file and creation of private libraries cannot both be done in the same job step.
3. For each job, label cards for the private libraries containing the same information as at creation time must be submitted. Note: Private libraries are not required to begin on a cylinder boundary.

MERGE FUNCTION

The MERGE function copies the contents of one core image, relocatable, source statement, or procedure library to another core image, relocatable, source statement, or procedure library, respectively. If the phase, module, book, or procedure being copied already exists in the library being updated, the resident phase, module, book, or procedure becomes inaccessible because its directory entry is deleted. Any phase, module, book, or procedure being copied is added to the library at the next available entry point. Its directory entry is added at the directory's next available entry point.

The control statement indicates the type of library (resident or private) involved and the direction in which the data will move. It has the following format:

```
MERGE from,to
```

The operand field entry from represents the file from which data will be copied. from can be one of these:

RES — System residence file on SYSRES.

NRS — Modified, or duplicate system residence file on SYS002 (New ReSidence).

PRV — Private relocatable library on SYS001 and/or a private source statement library on SYS000 and/or a private core image library on SYS003.

The operand field entry to indicates the file to which library data will be transferred. to can be one of these:

RES — System residence file on SYSRES.

NRS — Modified, or duplicate system residence file on SYS002 (New ReSidence).

PRV Private relocatable library on SYSRLB and/or private source statement library on SYSSLB and/or a private core image library on SYSCLB.

The MERGE statement is followed by appropriate copy statements (COPYC, COPYR, COPYS, COPYP) that indicate the phases, modules, books, or procedures to be transferred.

All copy statements following a MERGE statement apply to that function until another MERGE, NEWVOL, or ALLOC statement is encountered.

Notes:

1. If the COPYC ALL statement is used, the supervisor and transient phases are also transferred to the receiving system resident file or private core image library. The supervisor and transients previously contained on the receiving SYSRES or SYSCLB disk pack are deleted. No indication of this deletion is given, and it is the user's responsibility to ensure that the receiving system is able to continue operating.

2. If COPY ALL or COPYI $$A$IPL2 is specified, the IPL bootstrap phase at cylinder 0, track 1, record 5 of SYSRES is copied.

Core Image Library

Selected phases, or the entire library, can be transferred (in either direction) between:

1. The core image library of the system residence file on SYSRES and the core image library of another system residence file on SYS002.

2. A private core image library and the core image library of the system residence file on SYSRES.

3. A private core image library and the core image library of a system residence file on SYS002.

4. Two private core image libraries.

You must ascertain that the receiving system has the ability to execute the phase(s) being copied.

Relocatable Library

Selected modules, or the entire library, can be transferred (in either direction) between:

1. The relocatable library of the system residence file on SYSRES and the relocatable library of another system residence file on SYS002.

2. A private relocatable library and the relocatable library of the system residence file on SYSRES.

3. A private relocatable library and the relocatable library of a system residence file on SYS002.

4. Two private relocatable libraries.

Source Statement Library

Selected books or the entire library, can be transferred (in either direction) between:

1. The source statement library of the system residence file on SYSRES and the source statement library of another system residence file on SYS002.

2. A private source statement library and the source statement library of the system residence file on SYSRES.

3. A private source statement library and the source statement library of a system residence file on SYS002.

4. Two private source statement libraries.

Procedure Library

Selected procedures, or the entire procedure library, can be transferred (in either direction) between the procedure library of the system residence file on SYSRES and the procedure library of another system residence file on SYS002.

MERGE Considerations

File definitions (through DLBL and EXTENT statements) must be made before the MERGE control statement is used. When defining files, remember:

1. When merging to, or from, a modified or duplicate system residence file, the modified or duplicate file name must be IJSYSRS, the logical unit must be SYS002, and the file ID must be identical to the ID supplied when the file was created.

2. When merging to a private relocatable library file, the file name must be IJSYSRL, the logical unit must be SYSRLB, and the file ID must be identical to the ID supplied when the file was created.

3. When merging from a private relocatable library file, the file name must be IJSYSPR, the logical unit must be SYS001, and the file ID must be identical to the ID supplied when the file was created.

4. When merging to a private source statement library file, the file name must be IJSYSSL, the logical unit must be SYSSLB, and the file ID must be identical to the ID supplied when the file was created.

5. When merging from a private source statement library file, the file name must be IJSYSPS, the logical unit must be SYS000 and the file ID must be identical to the ID supplied when the file was created.

6. When merging to a private core image library file, the file name must be IJSYSCL, the logical unit must be SYSCLB, and the file ID must be identical to the ID supplied when the file was created.

7. When merging from a private core image library file, the file name must be IJSYSPC, the logical unit must be SYS003 and the file ID must be identical to the ID supplied when the file was created.

Figure 34 shows the file name, logical unit, and direction of transfer for each of the MERGE operations. Any combination of the indicated operations can be performed in one job step.

Diagnostic messages for erroneous assignments, file definitions, etc, are provided on SYSLST. Figure 35 is an example of a job set up to use the MERGE function.

		1	2	3	4	5	6	7
File Name / Logical Unit	IJSYSRS / SYSRES	IJSYSRS / SYS002	IJSYSRL / SYSRLB	IJSYSPR / SYS001	IJSYSSL / SYSSLB	IJSYSPS / SYS000	IJSYSCL / SYSCLB	IJSYSPC / SYS003
Merge RES to NRS	from	to						
Merge NRS to RES	to	from						
Merge RES to PRV	from		to		to		to	
Merge NRS to PRV		from	to		to		to	
Merge PRV to RES	to			from		from		from
Merge PRV to NRS		to		from		from		from
Merge PRV to PRV			to	from	to	from	to	from

Figure 34. Direction of Transfer for Merge Operations

```
          Assume two disk drives with addresses of 190 and 191.
          // JOB EXAMPLE
          // ASSGN SYSRLB,X'191'
          // ASSGN SYSSLB,X'191'
          // ASSGN SYS003,X'191'
          // ASSGN SYS000,X'190'
          // ASSGN SYS001,X'190'
          // ASSGN SYS002,X'191'

 Note 1   // DLBL IJSYSRL,'PRIVATE RL',99/365
   └      // EXTENT SYSRLB,111111,1,0,1500,100

 Note 2   // DLBL IJSYSSL,'PRIVATE SL',99/365
   └      // EXTENT SYSSLB,111111,1,0,1600,100

 Note 3   // DLBL IJSYSPC,'PRIVATE CIL',99/365
   └      // EXTENT SYS003,111111,1,0,1700,100

 Note 4   // DLBL IJSYSPR,'PRIVATE RL TEST',99/365
   └      // EXTENT SYS001,111111,1,0,1300,100

 Note 5   // DLBL IJSYSPS,'PRIVATE SL TEST',99/365
   └      // EXTENT SYS000,111111,1,0,1400,100

 Note 6   // DLBL IJSYSRS,'SYSTEM RESIDENCE',99/365
   └      // EXTENT SYS002,111111,1,0,1,179

          // EXEC CORGZ
   ┌         NEWVOL RL=10(2),SL=10(2),CL=10(15)
 Note 7      COPYR ALL
   │         COPYS ALL
   └         COPYC ALL
   ┌         MERGE PRV,PRV
 Note 8      COPYR ALL
   └         COPYS ALL
   ┌         MERGE NRS,PRV
 Note 9      COPYR ALL
   └         COPYS ALL
          /*
          // ASSGN SYS003,X'190'
          // ASSGN SYS002,X'191'

 Note 10  // DLBL IJSYSCL,'PRIVATE CIL',99/365
   └      // EXTENT SYSCLB,111111,1,0,1700,100

 Note 11  ASSGN SYSCLB,X'191'

 Note 12  // DLBL IJSYSPC,'PRIVATE CL TEST',99/365
   └      // EXTENT SYS003,111111,1,0,1500,100

 Note 13  // DLBL IJSYSRS,'SYSTEM RESIDENCE',99/365
   └      // EXTENT SYS002,111111,1,0,1,179

          // EXEC CORGZ

 Note 14     MERGE PRV,PRV
   └         COPYC ALL

 Note 15     MERGE NRS,PRV
   └         COPYC ALL

          /&
```

Figure 35. Example of Job Set Up to Use the MERGE Function (Part 1 of 2)

Note 1: File definition statements for a private relocatable library file to be created and updated.

Note 2: File definition statements for a private source statement library file to be created and updated.

Note 3: File definition statements for a private core image library file to be created.

Note 4: File definition statements for a private relocatable library file from which modules to be copied.

Note 5: File definition statements for a private source statement library file from which books are to be copied.

Note 6: File definition statements for a modified, or duplicate system residence file from which modules and books are tc be copied.

Note 7: Creates private core image, relocatable, and source statement libraries on SYS003, SYSRLB, and SYSSLB, and copies the core image, relocatable, and source statement libraries from the system residence file on SYSRES into them.

Note 8: Merges all modules and books from private relocatable and source statement libraries on SYS001 and SYS000 into the appropriate private libraries created on SYSRLB and SYSSLB.

Note 9: Merges all modules and books from the relocatable and source statement libraries of a modified, or duplicate system residence file cn SYS002 into private libraries created on SYSRLB and SYSSLB.

Note 10: File definition statements for the private core image library file just created and to be updated.

Note 11: In order to merge to the private core image library just created, assign it to SYSCLB. The from file must be assigned to SYS003 and is a previously created private core image library. See MERGE Considerations for additional information.

Note 12: File definition statements for a private core image library from which phases are to be copied.

Note 13: File definition statements for a modified, or duplicate system residence file from which the phases of the core image library are to be copied.

Note 14: Merges all phases from the private core image library on SYS003 into the newly created private core image library on SYSCLB.

Note 15: Merges all phases from the core image library of a modified, or duplicate system residence file on SYS002 into the newly created private core image library on SYSCLB.

Figure 35. Example of Job Set Up to Use the MERGE Function (Part 2 of 2)

SERVICE PROGRAMS

This section describes the control statements that can be submitted to one of the programs that service the libraries. There are six service programs:

- DSERV -- to display the directories of each of the libraries.
- CSERV -- to display and/or punch phases from the core image library.
- RSERV -- to display and/or punch modules from the relocatable library.
- SSERV -- to display and/or punch books from the source statement library.
- ESERV -- to de-edit, display and/or punch, verify, and update edited assembler macros from the source statement library.
- PSERV -- to display and/or punch procedures from the procedure library.

The following symbolic units must be assigned to perform service functions on a private library: SYSCLB for a private core image library, SYSRLB for a private relocatable library, and SYSSLB for a private source statement library. A private library must be unassigned to perform service functions on the corresponding system library.

DSERV, DIRECTORY SERVICE

This section describes the display of the directories. The copy function for the directories is discussed in the section Copy Program.

The format of the display depends upon the operation specified in the DSERV control statement(s).

Multiple displays of the same directory, either sorted or unsorted, may be obtained in the same job step. To do this, use a separate control statement for each desired display.

Operational Characteristics

If any private library is assigned, it is displayed in place of the corresponding system library. To display the system library, the corresponding private library must be unassigned.

The printed output of DSERV contains the status report of the system libraries and any assigned private libraries followed by the specified directory. Each printed directory is preceded by a header that contains the name of the directory in EBCDIC characters. All fields are headed by the title DEC (decimal) or HEX (hexadecimal). Generally, each page includes up to 96 directory entries printed in double-column format with 48 entries per column. However, the core image directory contains more information and is therefore printed in single column format with up to 48 entries per page. The additional information in the printout of the core image directory in response to a DSPLY(S) request indicates:

1. If the phase is SVA-eligible
2. If the phase is listed in the SDL
3. If the phase is contained in the SVA
4. Entry names contained in the SDL that have been established for future use, but do not as yet have phases attached to them. These entry names are listed as contained in the SDL only.

DSERV can be executed in any partition with the statement:

```
// EXEC DSERV
```

Except for a display of the core image directory, DSERV may require additional storage beyond the minimum of 64K available to the partition if a sorted display is specified. If the partition is not large enough to contain all the entries to be sorted, sorting is done in more than one pass, resulting in more than one sorted list of entries. If this is not satisfactory, increase the partition size.

If DSERV is to run in real mode, the REAL parameter must be included in the EXEC statement.

SYSLOG must not be assigned to a printer and SYSIN and SYSLST must be assigned.

DSERV Control Statements

The control statements for DSERV are:

```
{DSPLY }    directory[,directory]
{DSPLYS}    [(phasename[,nn])]
```

Name

Name field must be blank.

Operation

DSPLY Displays the directory entries in the sequence that they appear in the directory.

DSPLYS Displays the directory entries sorted alphamerically.

The entries in the core image directory are always displayed in alphameric sequence (DSPLY CD and DSPLYS CD give the same result).

Operands

Directory: Can be one of the following:

TD $-phases in the core image directory.

CD The core image directory

RD The relocatable directory

SD The source statement directory

PD The procedure directory

ALL All the above (TD, CD, RD, SD, and PD) are specified.

Note: If CD (without any other operands) or ALL is specified, the version and modification level of CD entries is not displayed.

Phasename: If CD is specified, then the version and modification level of any single phase or group of phases can be displayed by using phasename. Specify the phasename desired. If it contains less than eight characters, the specification should either be padded out with blanks (COBOL) or one blank should be included immediately after the last character of the phasename (COBOL). In the example, COBOL, if many phases contain the first five characters, COBOL, then to display the version and modification level of all of these phases specify (COBOL) without any blanks.

nn: Specify (in decimal) the displacement into the phase where the location of the version and modification level is for one of the following:

- A version and modification level in the nonstandard position.
- The version and modification level of the phase(s) specified is higher than that of the DSERV in use.

If nn is not specified, the program assumes 12 bytes for IBM-supplied transients and 8 bytes for all other entries.

Notes:

1. Only one phase or group of phases can be specified per CD control statement. If more than one is specified, then the last specification is the only one processed.
2. Continuation cards are not valid.
3. A blank operand or no control statement results in a system status report only.
4. The output of the core image directory also indicates if a phase is SVA-eligible, if it has an entry in the SDL (system directory list), and if it has been loaded in the SVA.

CSERV, CORE IMAGE LIBRARY

To request a service function for the core image library (either system or private), use the following EXEC control statement:

```
// EXEC CSERV
```

One or more of the three service functions can be requested within a single run. Punched output is sequenced in columns 77 through 80. The first card punched for each phase is sequenced zero. Any number of phases within the core image library can be acted upon in this run.

Display

The display function produces a printout of a phase in the core image library.

The printed output produced by the display function consists of a header and the phase. The printed header contains the phase name and the length of the phase in number of bytes.

The printed output of the phase contains a three-byte hexadecimal load address of the first byte in the line, followed by 48 bytes of text displayed in hexadecimal.

If the phase is relocatable, relocation information is printed following the text information.

The DSPLY control statement in one of the following formats is used to display phases in the core image library.

```
DSPLY phase1[,phase2,...]

DSPLY prog1.ALL[,prog2.ALL,...]

DSPLY ALL
```

The first format is used if only specific phases are to be displayed. The entry in the operation field is DSPLY. phase in the operand field represents the name of the phase to be displayed. If more than one phase is to be displayed, the phase names are separated by commas. Phase names must be from one to eight characters long.

The second format is used when an entire program is to be displayed. The entry in the operation field is DSPLY. In the operand field, prog refers to the first four characters of the phase names making up a program. (All phases of a multiphase program should have the same first four characters.) The four characters are followed by a period and ALL.

The third format is used if the entire core image library is to be displayed. The entry in the operation field is DSPLY. The entry in the operand field is ALL.

It is possible to use all three types of operands together in a single control statement.

For the display function, SYSIN must be assigned to a card reader, a tape unit, a disk unit, or a 3540 diskette. SYSLST must be assigned to a printer, a tape unit, a disk unit, or a 3540 diskette. SYSLOG must not be assigned to a printer.

Punch

The punch function converts a phase in the core image library into punched-cards or into a card-image format.

Any number of phases in the core image library can be punched within a single run unless SYSPCH is assigned to a disk or tape unit, or to a 3540 diskette (for subsequent use as SYSIPT to a link edit job step). In this case a maximum of 120 phases can be punched. The punched-card output is acceptable as input to the linkage editor for recataloging to the core image library. When non-relocatable phases are recataloged, they are loaded in a partition at the same address as when they were originally link-edited because their address(es) are absolute. Relocatable phases, however, are loaded at an address relative to the end of the supervisor (S + displacement).

The following cards are contained in the phase decks punched from the core image library.

1. PHASE card: contains the phase name and the beginning load address. If the phase that is punched is SVA-eligible, that is, if it has been cataloged as such, the SVA parameter is also punched in the PHASE card.

2. ESD card: SD type, contains the phase name, the length of the phase, and the beginning load address.

3. TXT cards: contain the loading address of the first byte in the card, the number of bytes of text punched in the card (usually 56, except for the last card), the identification number of the control section (always 0001) containing the text, and the actual text.

4. END card: contains the transfer address, and signifies the end of the phase.

If the phase is relocatable, RLD cards are also punched. These cards contain information that identifies those portions of the TXT cards that may need to be modified by the relocating loader.

To facilitate recataloging of the phase(s), a /* card will be the last card of any punched output of a CSERV job step. If SYSIPT and SYSPCH are assigned to the same card read punch, the end-of-file indicator (/*) from SYSIPT is selected to stacker 2.

The PUNCH control statement in one of the following formats is used to convert phases in the core image library to punched-card output.

```
PUNCH phase1[,phase2,...]

PUNCH prog1.ALL[,prog2.ALL,...]

PUNCH ALL
```

The first format is used if only specific phases are to be punched. The entry in the operation field is PUNCH. The entry in the operand field, phase, represents the name of the phase to be punched. If more than one phase is to be punched, the phase names are separated by commas. Phase names must be from one to eight characters long.

The second format is used when an entire program is to be punched. The entry in the operation field is PUNCH. In the operand field, prog refers to the first four characters of the phase names making up a program. (All phases of a multiphase

program should have the same first four characters.) The four characters are followed by a period and ALL.

The third format is used if the entire core image library is to be punched. The entry in the operation field is PUNCH. The entry in the operand field is ALL.

When SYSPCH is assigned to a tape or disk unit, each card image is preceded by a stacker-select character.

For the punch function, SYSIN must be assigned to a card reader, a tape unit, a disk unit, or a 3540 diskette. SYSPCH must be assigned to a card punch, a tape unit, or a disk unit. SYSLST must be assigned to a printer, a tape unit, a disk unit, or a 3540 diskette, SYSLOG must not be assigned to a printer.

Whenever the same card read punch is assigned to SYSIN and also to SYSPCH, enough blank cards for punching the module must follow each PUNCH control statement. This prevents erroneously punching the cards of a following job step. Extra cards are automatically bypassed.

Display and Punch

The display-and-punch function combines the separate operations of the display and the punch functions.

The DSPCH control statement is used to convert phases in the core image library to printed and punched-card output. The DSPCH control statement is in one of the following formats.

```
DSPCH phase1[,phase2,...]

DSPCH prog1.ALL[,prog2.ALL,...]

DSPCH ALL
```

The first format is used if only specific phases are to be displayed and punched. The entry in the operation field is DSPCH. The entry in the operand field, phase, represents the name of the phase to be displayed and punched. If more than one phase is to be displayed and punched, the phase names are separated by commas. Phase names must be from one to eight characters long.

The second format is used when an entire program is to be displayed and punched. The entry in the operation field is DSPCH. In the operand field, prog refers to the first four characters of the names of the phases making up the program. (All phases of a multiphase program should have the same first four characters.) The four characters are followed by a period and ALL.

The third format is used if the entire core image library is to be displayed and punched. The entry in the operation field is DSPCH. The entry in the operand field is ALL.

When SYSPCH is assigned to a tape or disk unit, each card image is preceded by a stacker-select character.

For the display and punch function, SYSIN must be assigned to a card reader, a tape unit, a disk unit, or a 3540 diskette. SYSLST must be assigned to a printer, a tape unit, or a disk unit. SYSPCH must be assigned to a card punch, a tape unit, a disk unit, or a 3540 diskette. SYSLOG must not be assigned to a printer.

Whenever the same card read punch is assigned to SYSIN and also to SYSPCH, enough blank cards for punching the module must follow each DSPCH control statement. This prevents erroneously punching the cards of a following job step. Extra cards are automatically bypassed.

RSERV, RELOCATABLE LIBRARY

To request a service function for the relocatable library, use the following EXEC control statement:

```
// EXEC RSERV
```

One or more of the three service functions can be requested within a single run. Any number of modules within the relocatable library can be acted upon in this run. Punched output is sequenced in columns 77 through 80. The first card punched for each module is sequenced zero.

Display

The display function produces a printout of a module in the relocatable library.

The printed output produced by the display function consists of a header and the module.

Contained in the printed header is the module name and the number of records needed to contain the module.

The printed output of the module is represented by hexadecimal characters and EBCDIC, depending on the type of record and the information contained within the record.

The DSPLY control statement in one of the following formats is used to display modules in the relocatable library.

```
DSPLY module1[,module2,...]

DSPLY prog1.ALL[,prog2.ALL,...]

DSPLY ALL
```

The first format is used if only specific modules are to be displayed. The entry in the operation field is DSPLY. module in the operand field represents the name of the module to be displayed. If more than one module is to be displayed, the module names are separated by commas. Module names must be from one to eight characters long.

The second format is used when an entire program is to be displayed. The entry in the operation field is DSPLY. In the operand field, prog refers to the first three characters of the modules used to build the program. (All IBM-supplied modules in the relocatable library making up a program have the same first three characters, such as IJQ for the assembler and IJS for COBOL.) The three characters are followed by a period and ALL.

The third format is used if the entire relocatable library is to be displayed. The entry in the operation field is DSPLY. The entry in the operand field is ALL.

For the display function, SYSIN must be assigned to a card reader, a tape unit, a disk unit, or a 3540 diskette. SYSLST must be assigned to a printer, a tape unit, a disk unit, or a 3540 diskette. SYSLOG must not be assigned to a printer.

Punch

The punch function converts a module in the relocatable library into a punched-card output check.

The PUNCH control statement in one of the following formats is used to convert modules in the relocatable library to punched-card output.

```
PUNCH module1[,module2,...]

PUNCH prog1.ALL[,prog2.ALL,...]

PUNCH ALL
```

The first format is used if only specific modules are to be punched. The entry in the operation field is PUNCH. The entry in the operand field, module, represents the name of the module to be punched. If more than one module is to be punched, the module names are separated by commas. Module names must be from one to eight characters long.

The second format is used when an entire program is to be punched. The entry in the operation field is PUNCH. In the operand field, prog refers to the first three characters of the modules used to build the program. (All IBM-supplied modules in the relocatable library making up a program have the same first three characters, such as IJQ for the assembler and ILA and ILG for COBOL.) The three characters are followed by a period and ALL.

The third format is used if the entire relocatable library is to be punched. The entry in the operation field is PUNCH. The entry in the operand field is ALL.

When SYSPCH is assigned to a tape or disk unit, each card image is preceded by a stacker-select character.

For the punch function, SYSIN must be assigned to a card reader, a tape unit, a disk unit, or a 3540 diskette. SYSPCH must be assigned to a card punch, a tape unit, or a disk unit. SYSLST must be assigned to a printer, a tape unit, a disk unit, or a 3540 diskette, and SYSLOG must not be assigned to a printer.

Whenever the same card read punch is assigned to SYSIN and also to SYSPCH, enough blank cards for punching the module must follow each PUNCH control statement. This prevents erroneously punching the cards of a following job step. Extra cards are automatically bypassed.

Display and Punch

The display-and-punch function combines the separate operations of the display and the punch functions.

The DSPCH control statement is used to convert modules in the relocatable library to printed and punched-card output. The DSPCH control statement is in one of the following formats.

```
DSPCH module1[,module2,...]

DSPCH prog1.ALL[,prog2.ALL,...]

DSPCH ALL
```

The first format is used if only specific modules are to be displayed and punched. The entry in the operation field is DSPCH. The entry in the operand field, module, represents the name of the module to be displayed and punched. If more than one module is to be displayed and punched, the module names are separated by commas.

Module names must be from one to eight characters long.

The second format is used when an entire program is to be displayed and punched. The entry in the operation field is DSPCH. In the operand field, prog refers to the first three characters of the modules used to build the program. (All IBM-supplied modules in the relocatable library making up a program have the same first three characters, such as IJQ for the assembler and ILA and ILG for COBOL.) The three characters are followed by a period and ALL.

The third format is used if the entire relocatable library is to be displayed and punched. The entry in the operation field is DSPCH. The entry in the operand field is ALL.

When SYSPCH is assigned to a tape or disk unit, or a 3540 diskette, each card image is preceded by a stacker-select character.

For the display and punch function, SYSIN must be assigned to a card reader, a tape unit, a disk unit, or a 3540 diskette. SYSLST must be assigned to a printer, a tape unit, a disk unit, or a 3540 diskette. SYSPCH must be assigned to a card punch, a tape unit, or a disk unit. SYSLOG must not be assigned to a printer.

Whenever the same card read punch is assigned to SYSIN and also to SYSPCH, enough blank cards for punching the module must follow each DSPCH control statement. This prevents erroneously punching the cards of a following job step. Extra cards are automatically bypassed.

SSERV, SOURCE STATEMENT LIBRARY

To request a service function for the source statement library, use the following job control statement:

```
// EXEC SSERV
```

One or more of the three service functions can be requested within a single run. Any number of books within the source statement library can be acted upon in this run.

Display

The display function produces a printout of a book in the source statement library.

Books are displayed in the card image format. Each book is preceded and followed by a BKEND statement.

The DSPLY control statement in one of the following formats is used to display books in the source statement library.

```
DSPLY sublib.book1[,sublib.book2,...]

DSPLY sublib1.ALL[,sublib2.ALL,...]

DSPLY ALL
```

The first format is used if only specific books are to be displayed. The entry in the operation field is DSPLY. The qualifier sublib in the operand field represents the sublibrary containing the book to be displayed and can be any alphameric character (0-9, A-Z, #, $, and @), representing source statement sublibraries.

book in the operand field represents the name of the book in the sublibrary to be displayed. If more than one book is to be displayed, the entries must be separated by commas. If books to be displayed are in the same sublibrary, subsequent book names need not be qualified. (The librarian assumes that nonqualified books are in the last sublibrary specified. If a sublibrary is never specified, the librarian assumes the book is in the assembler sublibrary.) The names of the books in the operand field can be from one to eight characters in length. Continuation statements are not recognized.

The second format is used if an entire sublibrary is to be displayed. The entry in the operation field is DSPLY. The first entry in the operand field is the name of the sublibrary to be displayed. The qualifier sublib can be any alphameric character (0-9, A-Z, #, $, and @), representing source statement sublibraries.

The sublib qualifier is required. If omitted, the operand is flagged as invalid and no processing is done on the sublibrary.

The second entry in the operand field is ALL. The two entries must be separated by a period.

The third format is used if the entire source statement library is to be displayed. The entry in the operation field is DSPLY. The entry in the operand field is ALL.

For the display function, SYSIN must be assigned to a card reader, a tape unit, a disk unit, or a 3540 diskette. SYSLST must be assigned to a printer, a tape unit, a disk unit, or a 3540 diskette. SYSLOG must not be assigned to a printer.

Punch

The punch function converts a book in the source statement library into punched cards or into card-image format.

The PUNCH control statement in one of the following formats is used to convert books in the source statement library to punched-card output.

```
PUNCH sub.book1[,sub.book2,...][,CMPRSD]

PUNCH sub1.ALL[,sub2.ALL,...][,CMPRSD]

PUNCH ALL[,CMPRSD]
```

The first format is used if only specific books are to be punched. The entry in the operation field is PUNCH. The qualifier sub in the operand field represents the sublibrary containing the book to be punched and can be alphameric character (0-9, A-Z, #, $, and @), representing source statement sublibraries.

book in the operand field represents the name of the book in the sublibrary to be punched. The entry CMPRSD is used if the books are to be punched in the compressed form in which they are stored in the library. When this option is elected, the cards are punched in the first seventy-one columns. If more than one book is to be punched, the entries must be separated by commas. If books to be punched are in the same sublibrary, subsequent book names need not be qualified. (The librarian assumes that nonqualified books are in the last sublibrary specified. If a sublibrary is never specified, the librarian assumes the book is in the assembler sublibrary.) The names of the books in the operand field can be from one to eight characters long. Continuation statements are not recognized.

The second format is used if an entire sublibrary is to be punched. The entry in the operation field is PUNCH. The first entry in the operand field is the name of the sublibrary to be punched. The qualifier sub can be any alphameric character (0-9, A-Z, #, $, and @), representing source statement sublibraries.

The sublib qualifier is required. If omitted, the operand is flagged as invalid and no processing is done on the sublibrary.

The second entry in the operand field is ALL. The entry CMPRSD is used if the books are to be punched in the compressed format. A /* statement is always punched at the end of the output. When SYSPCH is assigned to a tape unit or disk unit, each card image is preceded by a stacker-select character.

The third format is used if the entire source statement library is to be punched. The entry in the operation field is PUNCH. The entry in the operand field is ALL. The entry CMPRSD is used if the books are to be punched in the compressed format. If CMPRSD is specified, punched output is sequenced in columns 77-80. The first card punched for each module is zero. The compressed source code retains its original sequence numbers. A /* statement is always punched at the end of the output.

For the punch function, SYSIN must be assigned to a card reader, a tape unit, a disk unit, or a 3540 diskette. SYSPCH must be assigned to a card punch, a tape unit, a disk unit, or a 3540 diskette. SYSLST must be assigned to a printer, a tape unit, or a disk unit, and SYSLOG must not be assigned to a printer.

Whenever the same card read punch is assigned to SYSRDR and also to SYSPCH, enough blank cards for punching the book must follow each PUNCH control statement. This prevents erroneously punching the cards of a following job step. Extra cards are automatically bypassed.

Display and Punch

The display-and-punch function combines the separate operations of the display function and the punch function.

The DSPCH control statement in one of the following formats is used to convert books in the source statement library to printed and punched-card output.

```
DSPCH sub.book1[,sub.book2,...][,CMPRSD]

DSPCH sub1.ALL[sub2.ALL,...][,CMPRSD]

DSPCH ALL[,CMPRSD]
```

The first format is used if only specific books are to be displayed and punched. The entry in the operation field is DSPCH. The qualifier sub in the operand field represents the sublibrary containing the book to be displayed and punched and can be any alphameric character (0-9, A-Z, #, $, and @), representing source statement sublibraries.

book in the operand field represents the name of the book in the sublibrary to be displayed and punched. The entry CMPRSD is used if the books are to be punched in the compressed format, but printed in the original card image format. If more than one book is to be displayed and punched, the entries must be separated by commas. If books to be displayed and punched are in the same sublibrary, subsequent book names need not be qualified. (The librarian

assumes that nonqualified books are in the last sublibrary specified. If a sublibrary is never specified, the librarian assumes the book is in the assembler sublibrary.) The names of the books in the operand field can be from one to eight characters long. Continuation statements are not recognized. A /* statement is punched at the end of the output.

The second format is used if an entire sublibrary is to be displayed and punched. The entry in the operation field is DSPCH. The first entry in the operand field is the name of the sublibrary to be displayed and punched. The qualifier sub can be any alphameric character (0-9, A-Z, #, $, and @), representing source statement sublibraries.

The sublib qualifier is required. If omitted, the operand is flagged as invalid and no processing is done on the sublibrary.

The second entry in the operand field is ALL. The entry CMPRSD is used if the books are to be punched in the compressed format. When SYSPCH is assigned to a tape or disk unit, each card image is preceded by a stacker-select character.

The third format is used if the entire source statement library is to be displayed and punched. The entry in the operation field is DSPCH. The entry in the operand field is ALL. The entry CMPRSD is used if the books are to be punched in the compressed format.

For the display and punch function, SYSIN must be assigned to a card reader, a tape unit, a disk unit, or a 3540 diskette. SYSLST must be assigned to a printer, a tape unit, a disk unit. SYSPCH must be assigned to a card punch, a tape unit, a disk unit, or a 3540 diskette. SYSLOG must not be assigned to a printer.

Whenever the same card read punch is assigned to SYSIN and also to SYSPCH, enough blank cards for punching the book must follow each DSPCH control statement. This prevents erroneously punching the cards of a following job step. Extra cards are automatically bypassed.

ESERV, SOURCE STATEMENT LIBRARY

The DOS/VS assembler uses two sublibraries of the source statement library: the macro (E) sublibrary and the copy (A) sublibrary.

To request a service or maintenance function for edited assembler macros in the E sublibrary, specify:

```
// EXEC ESERV
```

Input to ESERV is read from SYSIPT. The first card after the // EXEC ESERV statement should be GENEND or GENCATALS. If neither is present, GENCATALS is assumed. These cards, as shown below, must not start in column 1.

bGENENDb no operands

This causes ESERV to place an END and a /* card immediately after the de-edited macro on SYSPCH so that it can be used as SYSIPT for the assembler.

bGENCATALSb no operands

This causes a CATALS statement of the form A book to precede and a /* card to follow each macro so that the resulting SYSPCH stream can be used as SYSIPT input to the MAINT program for cataloging the de-edited macros into the A sublibrary.

Display and Punch Functions

The following functions can be performed for one or more edited macros within a single ESERV run.

1. DSPLY De-edits and displays macro(s) on SYSLST.
2. PUNCH De-edits and punches macro(s) on SYSPCH.
3. DSPCH Combines 1 and 2.

The control statements must not start in column 1 and have the following format:

```
{DSPLY}
{PUNCH}  sublib.book1[,sublib.book2...]
{DSPCH}
```

If the qualifier sublib is omitted, the E sublibrary is assumed. If the de-edited macro is to be updated, the appropriate control statements must follow immediately. (See 4-10 below.)

Verification and Update Functions

These functions can be performed for a single de-edited macro or the last de-edited macro in an ESERV run.

4. COL Defines location and length of sequence number field.

5. VER Verifies contents of a specific statement.

6. ADD Adds statement(s) at a specified point.

7. DEL Deletes specified statements.

8. REP Replaces specified statement(s).

9. END Indicates last update statement.

10. RST Indicates that sequence number restart a lower number than a number contained in a specified preceding statement of the macro definition.

These control statements can be used to verify and/or update properly identified statements in an edited macro definition.

Verifying and Updating Macro Definitions

Statements are identified either by the sequence number in the identification field or by their position relative to a previous statement that has a sequence number as follows:

seq-no[+rel]

seq-no sequence number of a source statement, 1 to 8 decimal digits in length, as specified in the COL statement.

rel positive decimal number, 1 to 4 digits in length, representing the position of the desired statement relative to the sequence numbered statements.

COL STATEMENT: specifies the location of the sequence number in the macro definition. If present, this statement must immediately follow the DSPLY, PUNCH or DSPCH statement to which it applies. The format is:

) COL startcol,x

startcol is a decimal number from 73 to 80 which gives the starting position of the sequence number.

x is a decimal number from 1 to 8 giving the length of the sequence number.

If the COL statement is omitted, the default is:

) COL 73,6

VER STATEMENT: causes a specific source statement to be verified against the contents of the statement following the VER statement on SYSIPT. Its format is:

) VER seq-no[+rel],len

len is the length of the field to be verified. It is a decimal number with a value of from 1 to 80. Only the first len characters are compared. If the strings do not match, an error message is given.

ADD STATEMENT: adds statements to a source macro definition. Its format is:

) ADD seq-no[+rel]

The source statements following the ADD statement are added to the macro definition after the indicated statement number.

DEL STATEMENT: deletes one or more statements from a macro source definition. Its format is:

) DEL seq-no[+rel][,seq-no[+rel]]

The statement number indicates the first and last in the series to be deleted. Only the first number is required to delete one statement.

REP STATEMENT: replaces one or more statements in a source macro definition with one or more new statements. Its format is:

) REP seq-no[+rel][,seq-no[+rel]]

The source statement(s) following the REP statement replace the statement or series of statements identified by the REP statement.

RST STATEMENT: indicates to ESERV that the sequence numbers of the macro definition restart at a lower number after the statement indicated by the RST statement. The format is:

) RST seq-no[+rel]

Note: If an ADD, DEL or REP operation is performed on the last statement in a sequence number series, then the first statement in the new series must be referenced in the RST statement. See example 3.

END STATEMENT: indicates the end of the update statements on SYSIPT. Its format is:

```
)     END
```

This statement is required for every updating run.

General Rules for Update Control Statements

1. Right parenthesis in column 1 and at least one blank before and after operation code.

2. Any seq-no[+rel] must specify a source statement after the previous seq-no[+rel], except that:

   a. The two numbers specified in a DEL or REP statement may be equal;

   b. the REP, DEL, ADD, or RST statement may reference the same statement as the immediately preceding VER statement.

3. Any seq-no must be greater than or equal to either the last seq-no in the previous statement or the first seq-no in the same statement.

   Exception: The first seq-no in the control statement following the RST statement is independent of the seq-no in the RST statement.

Error Handling During Update

The following errors will cause cancellation of the update run.

1. Invalid operands in the COL statement.

2. The COL statement is not the first update control statement.

3. The macro is completely de-edited without all update control statements having been processed.

4. Invalid operands in the RST statement.

In all other cases, an error message is printed. Updating continues with the next control statement, if possible. De-editing of the macro will always be completed.

Example 1: De-editing Without Updating

```
// JOB SAMPL1
// EXEC ESERV
   PUNCH E.MAC1,MAC2
   DSPLY MAC3
   DSPCH E.MAC4,E.MAC5
/*
/&
```

The above coding shows five macros being de-edited in the same run. The resulting listings and/or decks could be used for future updates. Note that the last macro de-edited (MAC5) could also have been updated in this run. All are taken from the macro sublibrary, since E.macname is the default.

Example 2: De-editing with Updating

```
// JOB SAMPLE
// EXEC ESERV
   GENEND
   DSPCH E.MAC1
)  COL 77,4
)  VER 72+1,5
.PP99
)  ADD 72+1
     AIF (&PCH NE 1400).D4
)  DEL 102,103+3
)  REP 245+4,260
NITA  CLC 0(4,REG6),BLANKS
      BE  RETRY6
LYNDA CLC  4(4,REG6),BLANKS
      BE  RETRY7
)  END
/*
/&
```

This example produces a listing on SYSLST and a deck with an END and /* on SYSPCH of the de-edited and updated macro named MAC1. The resulting SYSPCH file (if on tape or disk) could thus be reassigned as SYSIPT for immediate editing by the DOS/VS assembler with EDECK specified in the option card.

In addition, the resulting updated edited macro deck could then, in another step, be cataloged to the E sublibrary via MAINT.

Example 3: Restarting

Sequence number in the macro to be updated:

```
0001
0003
0004
0005
0002
0004
0006
0007
0008
```

Sample update statements:

```
// EXEC ESERV
)  COL 77,4
)   DEL 5
)  RST 5+1
)  ADD 4
   B   NEXT1
)  END
```

In this example, GENCATALS is assumed. Since statement 5 (the last in a series) is to be deleted, the RST statement must reference one past the statement being deleted.

PSERV, PROCEDURE LIBRARY

To request a service function for the procedure library, use the following EXEC control statement:

```
// EXEC PSERV
```

One or more of the three service functions can be requested within a single run. Any number of procedures within the procedure library can be acted upon in this run.

Display

The statement used to display procedures is DSPLY.

Statement Format:

```
{DSPLY procedurename[,procedurename,...]}
{DSPLY ALL                              }
```

procedurename specifies the name of the procedure to be displayed. If more than one procedure is to be displayed, the names are separated by commas. Procedure names are from one to eight alphameric characters, the first of which must be alphabetic or a $.

ALL specifies that the entire procedure library is to be displayed.

For the display function, SYSIN must be assigned to a card reader, a tape unit, a disk unit, or a 3540 diskette. SYSLST must be assigned to a printer, a tape unit, a disk unit, or a 3540 diskette. SYSLOG must not be assigned to a printer.

Punch

The control statement used to punch a procedure is PUNCH.

Statement Format:

```
{PUNCH procedurename[,procedurename,...]}
{PUNCH ALL                              }
```

procedurename represents the name of the procedure to be punched. If more than one procedure is to be punched, the names are separated by commas. The procedure name is from one to eight alphameric characters, the first of which must be alphabetic or a $.

ALL specifies that the entire procedure library is to be punched.

When SYSPCH is assigned to a tape or disk unit, each card image is preceded by a stacker-select character.

For the punch function, SYSIN must be assigned to a card reader, a tape unit, a disk unit, or a 3540 diskette. SYSPCH must be assigned to a card punch, a tape unit, a disk unit, or a 3540 diskette. SYSLST must be assigned to a printer, a tape unit, or a disk unit, and SYSLOG must not be assigned to a printer.

Whenever the same card read punch is assigned to SYSIN and also to SYSPCH, enough blank cards for punching the module must follow each PUNCH control statement. This prevents erroneously punching the cards of a following job step. Extra cards are automatically bypassed.

The punched-card output is acceptable to every function that uses procedure input. Each procedure punched is preceded by a CATALP statement. The last card punched is the /* statement.

Display and Punch

The control statement used to print and punch procedures is DSPCH.

Statement Format:

```
{DSPCH procedurename[,procedurename,...]}
{DSPCH ALL                              }
```

procedurename represents the name of the procedure to be displayed and punched. If more than one procedure is to be displayed and punched, the names are separated by commas. Module names are from one to eight alphameric characters, the first of which must be alphabetic or a $.

ALL specifies that the entire procedure library is to be printed and punched.

When SYSPCH is assigned to a tape or disk unit, or a 3540 diskette, each card image is preceded by a stacker-select character.

For the display and punch function, SYSIN must be assigned to a card reader, a tape unit, a disk unit, or a 3540 diskette. SYSLST must must be assigned to a printer, a tape unit, a disk unit, or a 3540 diskette. SYSPCH must be assigned to a card punch, a tape unit, or a disk unit. SYSLOG must not be assigned to a printer.

Whenever the same card read punch is assigned to SYSIN and also to SYSPCH, enough blank cards for punching the procedure must follow each DSPCH control statement. This prevents erroneously punching the cards of a following job step. Extra cards are automatically bypassed.

The last card punched by DSPCH is a /* statement.

Function	Unit	Element	Control Statements

Catalog	Core Image Library	Phase	// OPTION CATAL
			(Linkage Editor control statements and if in card form, the phase to be cataloged)
			/*
			// EXEC LNKEDT

	Relocatable Library	Module	// EXEC MAINT CATALR modulename[,v,m] (module to be cataloged)
	Source Statement Library	Book	// EXEC MAINT CATALS sublib.bookname[,v.m[,C]] (book to be cataloged)
	Procedure Library	Proced.	// EXEC MAINT CATALP procedurename[,VM=v.m][,EOP=yy][,DATA=NO / YES] (procedure to be cataloged) /+ (or delimiter as specified in EOP parameter)

Compile/ Assemble and Catalog	Relocatable Library	Module	Using a tape file for SYSPCH/SYSIPT with temporary assignments.
			
			// ASSGN SYSPCH,X'cuu'
			CATALR modulename[,v.m]
			PHASE name,origin[,NCAUTO]
			// EXEC COBOL
			(source deck)
			/*
			// MTC WTM,SYSPCH,2
			// MTC REW,SYSPCH
			// ASSGN SYSIPT,X'cuu'
			// EXEC MAINT
			/&
			
			To compile/assemble more than one program and catalog all of them into the relocatable library, use the same setup except that the compilation/assembly control cards (CATALR through /* inclusive) for each program follow the /* of the preceding program. The MTC statements through /& follow the /* of the last program. This facility is not available for RPG and PL/I compilations or for IBM 2314 or IBM 2319 applications.
			
			Using a DASD file for SYSPCH/SYSIPT. (Must always be a permanent assignment.)
			
			// DLBL Balance of information
			// EXTENT required for SYSPCH file
			ASSGN SYSPCH,X'cuu'
			CATALR modulename[,v.m]
			PHASE name,crigin[,NCAUTO]
			// EXEC COBOL
			(source deck)
			/*
			CLOSE SYSPCH,X'00D'
			// DLBL Balance of information
			// EXTENT required for SYSIPT file
			ASSGN SYSIPT,X'cuu'
			// EXEC MAINT
			/&

Figure 36. Maintenance Functions, Example (Part 1 of 3)

Function	Unit	Element	Control Statements
			The 'file-ID' in the DLBL statements must be the same in both sets. To compile/assemble more than one program and catalog all of them into the relocatable library, use the same setup except that the compilation/assembly control cards (CATALR through /* inclusive) for each program follow the /* of the preceding program. CLOSE through /& follow the /* of the last program.
Delete	Core Image Library	Phase	// EXEC MAINT DELETC phase1[,phase2,...]
		Program	// EXEC MAINT DELETC prog1.ALL[,prog2.ALL,...]
	Relocatable Library	Module	// EXEC MAINT DELETR module1[,module2,...]
		Program	// EXEC MAINT DELETR prog1.ALL[,prog2.ALL,...]
		Library	// EXEC MAINT DELETR ALL
	Source Statement Library	Book	// EXEC MAINT DELETS sublib.book1[,sublib.book2,...]
		Sub-library	// EXEC MAINT DELETS sublib.ALL
		Library	// EXEC MAINT DELETS ALL
	Procedure Library	Proced.	// EXEC MAINT DELETP procedurename1[,procedurename2,...]
		Library	// EXEC MAINT DELETP ALL
Rename	Core Image Library	Phase	// EXEC MAINT RENAMC oldname,newname[,oldname,newname,...]
	Relocatable Library	Module	// EXEC MAINT RENAMR oldname,newname[,oldname,newname,...]
	Source Statement Library	Book	// EXEC MAINT RENAMS sublib.oldname,sublib.newname[,sublib. oldname,sublib.newname,...]
	Procedure Library	Proced.	// EXEC MAINT RENAMP oldname,newname[,oldname,newname....]
Update	Source Statement Library	Book	// EXEC MAINT UPDATE sublib.bookname,[s.book1],[v.m],[nn]) ADD,) DEL, or) REP statements as required with source statements to be added) END [v.m[,C]]

Figure 36. Maintenance Functions, Example (Part 2 of 3)

Function	Unit	Element	Control Statements
Condense	Core Image Library	Library	// EXEC MAINT CONDS CL

	Relocatable Library	Library	// JOB jobname
			// EXEC MAINT
			CONDS RL

	Source Statement Library	Library	// EXEC MAINT CONDS SL
	Procedure Library	Library	// EXEC MAINT CONDS PL
	Libraries	All	// EXEC MAINT CONDS CL,RL,SL,PL
Set Parameter for Automatic Condense	Libraries	Any or All	// EXEC MAINT CONDL lib=nnnnn[,lib=nnnnn,...] Notes: Values to be substitued for lib: CL -- Core image library PL -- Procedure Library RL -- Relocatable library SL -- Source statement library Values to be substitued for nnnnn: One to five decimal digits, with a maximum value of 65536.

Reallo-cation	System	Library	// DLBL IJSYSRS,'DOS SYSTEM RESIDENCE FILE'date,code
			// EXTENT SYSRES,balance of extent information
			// EXEC MAINT
			ALLOC CL=cylin(tracks),RL=cylin(tracks),
			SL=cylin(tracks),PL=cylin(tracks)
			
			Notes: The library identifiers are as follows:
			
			CL -- Core image library
			PL -- Procedure Library
			RL -- Relocatable library
			SL -- Source statement library
			
			Values to be substitued for cylin and tracks: any integer.

Note: // JOB, /*, and /& must be included where needed.

Figure 36. Maintenance Function, Example (Part 3 of 3)

Display Unit	Element	Control Statements
Core Image Library	Phase	// EXEC CSERV DSPLY phase1[,phase2,...]
	Program	// EXEC CSERV DSPLY prog1,ALL[,prog2.ALL,...]
	Library	// EXEC CSERV DSPLY ALL
	Directory	// EXEC DSERV DSPLY CD or DSPLYS CD
	Phases(s) with Version and Modification Level	In the standard position: // EXEC DSERV DSPLY[S] CD(phasename) or CD(phasename)
	Phase(s) with Version and Modification Level	In the nonstandard position or higher than DSERV in use: // EXEC DSERV DSPLY[S] CD(phasename,nn) or CD(phasename,nn)
Relocatable Library	Module	// EXEC RSERV DSPLY module1[,module2,...]
	Program	// EXEC RSERV DSPLY prog1.ALL[.prog2.ALL,...]
	Library	// EXEC RSERV DSPLY ALL
	Directory	// EXEC DSERV DSPLY RD or DSPLYS RD
Source Statement Library	Book	// EXEC SSERV DSPLY sublib.book1[.sublib.book2,...]
	Sublibrary	// EXEC SSERV DSPLY sublib1.ALL[,sublib2.ALL,...]
	Library	// EXEC SSERV DSPLY ALL
	Directory	// EXEC DSERV DSPLY SD or DSPLYS SD
Procedure Library	Procedure	// EXEC PSERV DSPLY procedurename1[,procedurename2,...]
	Library	// EXEC PSERV DSPLY ALL
	Directory	// EXEC DSERV DSPLY PD or DSPLYS PD

Figure 37. Service Functions, Example (Part 1 of 3)

Punch Unit	Element	Control Statements
Transient Directory	Directory	// EXEC DSERV DSPLY TD or DSPLYS TD
System Directory	Directory	// EXEC DSERV
Directories	All	// EXEC DSERV DSPLY ALL or DSPLYS ALL
Core Image Library	Phase	// EXEC CSERV PUNCH phase1[,phase2,...]
	Program	// EXEC CSERV PUNCH prog1.ALL[,prog2.ALL,...]
	Library	// EXEC CSERV PUNCH ALL
Relocatable Library	Module	// EXEC RSERV PUNCH module1[,module2,...]
	Program	// EXEC RSERV PUNCH prog1.ALL[.prog2.ALL,...]
	Library	// EXEC RSERV PUNCH ALL
Source Statement Library	Book	// EXEC SSERV PUNCH sublib.book1[,sublib.book2,...][,CMPRSD]
	Sublibrary	// EXEC SSERV PUNCH sublib1.ALL[,sublib2.ALL,...][,CMPRSD]
	Library	// EXEC SSERV PUNCH ALL[,CMPRSD]
Procedure Library	Procedure	// EXEC PSERV PUNCH procedurename1[,procedurename2,...]
	Library	// EXEC PSERV PUNCH ALL

Figure 37. Service Functions, Example (Part 2 of 3)

Display and Punch Unit	Element	Control Statements
Core Image Library	Phase	// EXEC CSERV DSPCH phase1[,phase2,...]
	Program	// EXEC CSERV DSPCH prog1.ALL[,prog2.ALL,...]
	Library	// EXEC CSERV DSPCH ALL
Relocatable Library	Module	// EXEC RSERV DSPCH module1[,module2,...]
	Program	// EXEC RSERV DSPCH prog1.ALL[,prog2.ALL,...]
	Library	// EXEC RSERV DSPCH ALL
Source Statement Library	Book	// EXEC SSERV DSPCH sublib.book1[,sublib.book2,...][,CMPRSD]
	Sublibrary	// EXEC SSERV DSPCH sublib1.ALL[,sublib2.ALL,...][,CMPRSD]
	Library	// EXEC SSERV DSPCH ALL[,CMPRSD]
Procedure Library	Procedure	// EXEC PSERV DSPCH procedurename1[,procedurename2,...]
	Library	// EXEC PSERV DSPCH ALL

Note: // JOB, /*, and /& must be included where needed.

Figure 37. Service Functions, Example (Part 3 of 3)

Copy Unit	Element	Control Statements

Core Image Library	Phase	// ASSGN SYS002,X'cuu'
		// DLBL IJSYSRS,'DOS/VS SYSTEM RESIDENCE FILE',date,code
		// EXTENT SYS002,balance of extent information
		// EXEC CORGZ
		ALLOC CL=cylin(tracks),RL=cylin(tracks),
		SL=cylin(tracks),PL=cylin(tracks)
		COPYC phase1[,phase2,...]

	Program	// ASSGN SYS002,X'cuu'
		// DLBL IJSYSRS,'DOS/VS SYSTEM RESIDENCE FILE',date,code
		// EXTENT SYS002,balance of extent information
		// EXEC CORGZ
		ALLOC CL=cylin(tracks),RL=cylin(tracks),
		SL=cylin(tracks),PL=cylin(tracks)
		COPYC prog1.ALL[,prog2.ALL,...]

	Library	// ASSGN SYS002,X'cuu'
		// DLBL IJSYSRS,'DOS/VS SYSTEM RESIDENCE FILE',date,code
		// EXTENT SYS002,balance of extent information
		// EXEC CORGZ
		ALLOC CL=cylin(tracks),RL=cylin(tracks),
		SL=cylin(tracks),PL=cylin(tracks)
		COPYC ALL

Relocatable Library	Module	// ASSGN SYS002,X'cuu'
		// DLBL IJSYSRS,'DOS/VS SYSTEM RESIDENCE FILE',date,code
		// EXTENT SYS002,balance of extent information
		// EXEC CORGZ
		ALLOC CL=cylin(tracks),RL=cylin(tracks),
		SL=cylin(tracks),PL=cylin(tracks)
		COPYR module1[,module2,...]

	Program	// ASSGN SYS002,X'cuu'
		// DLBL IJSYSRS,'DOS/VS SYSTEM RESIDENCE FILE',date,code
		// EXTENT SYS002,balance of extent information
		// EXEC CORGZ
		ALLOC CL=cylin(tracks),RL=cylin(tracks),
		SL=cylin(tracks),PL=cylin(tracks)
		COPYR prog1.ALL[,prog2.ALL,...]

	Library	// ASSGN SYS002,X'cuu'
		// DLBL IJSYSRS,'DOS/VS SYSTEM RESIDENCE FILE',date,code
		// EXTENT SYS002,balance of extent information
		// EXEC CORGZ
		ALLOC CL=cylin(tracks),RL=cylin(tracks),
		SL=cylin(tracks),PL=cylin(tracks)
		COPYR ALL

Figure 38. Copy Function, Example (Part 1 of 5)

Copy Unit	Element	Control Statements

Source Statement Library	Book	// ASSGN SYS002,X'cuu'
		// DLBL IJSYSRS,'DOS/VS SYSTEM RESIDENCE FILE',date,code
		// EXTENT SYS002,balance of extent information
		// EXEC CORGZ
		ALLOC CL=cylin(tracks),RL=cylin(tracks),
		SL=cylin(tracks),PL=cylin(tracks)
		COPYS sublib.book1[,sublib.book2,...]

	Sublibrary	// ASSGN SYS002,X'cuu'
		// DLBL IJSYSRS,'DOS/VS SYSTEM RESIDENCE FILE',date,code
		// EXTENT SYS002,balance of extent information
		// EXEC CORGZ
		ALLOC CL=cylin(tracks),RL=cylin(tracks),
		SL=cylin(tracks),PL=cylin(tracks)
		COPYS sublib1.ALL[,sublib2.ALL,...]

	Library	// ASSGN SYS002,X'cuu'
		// DLBL IJSYSRS,'DOS/VS SYSTEM RESIDENCE FILE',date,code
		// EXTENT SYS002,balance of extent information
		// EXEC CORGZ
		ALLOC CL=cylin(tracks),RL=cylin(tracks),
		SL=cylin(tracks),PL=cylin(tracks)
		COPYS ALL

Procedure Library	Procedure	// ASSGN SYS002,X'cuu'
		// DLBL IJSYSRS,'DOS/VS SYSTEM RESIDENCE FILE',date,code
		// EXTENT SYS002,balance of extent information
		// EXEC CORGZ
		ALLOC CL=cylin(tracks),RL=cylin(tracks),
		SL=cylin(tracks),PL=cylin(tracks)
		COPYP procedurename1[,procedurename2,...]

	Library	// ASSGN SYS002,X'cuu'
		// DLBL IJSYSRS,'DOS/VS SYSTEM RESIDENCE FILE',date,code
		// EXTENT SYS002,balance of extent information
		// EXEC CORGZ
		ALLOC CL=cylin(tracks),RL=cylin(tracks),
		SL=cylin(tracks),PL=cylin(tracks)
		COPYP ALL

Libraries	All	// ASSGN SYS002,X'cuu'
		// DLBL IJSYSRS,'DOS/VS SYSTEM RESIDENCE FILE',date,code
		// EXTENT SYS002,balance of extent information
		// EXEC CORGZ
		ALLOC CL=cylin(tracks),RL=cylin(tracks),
		SL=cylin(tracks),PL=cylin(tracks)
		COPY ALL

Figure 38. COPY Function, Example (Part 2 of 5)

Copy Unit	Element	Control Statements

Definition of a Private Library (Note 2)	Core Image	// ASSGN SYS003,X'cuu'
		// DLBL IJSYSPC,'user identification of private library',date,code
		// EXTENT SYS003,balance of extent information
		// EXEC CORGZ
		NEWVOL CL=cylin(tracks)

	Relocatable	// ASSGN SYSRLB,X'cuu'
		// DLBL IJSYSRL,'user identification of private library',date,code
		// EXTENT SYSRLB,balance of extent information
		// EXEC CORGZ
		NEWVOL RI=cylin(tracks)

	Source Statement	// ASSGN SYSSLB,X'cuu'
		// DLBL IJSYSSL,'user identification of private library',date,code
		// EXTENT SYSSLB,balance of extent information
		// EXEC CORGZ
		NEWVOL SI=cylin(tracks)

Definition and Creation of a Private Library (Note 2)	Core Image	// ASSGN SYS003,X'cuu'
		// DLBL IJSYSPC,'user identification of private library',date,code
		// EXTENT SYS003,balance of extent information
		// EXEC CORGZ
		NEWVOL CL=cylin(tracks)
		COPYC operands

	Relocatable	// ASSGN SYSRLB,X'cuu'
		// DLBL IJSYSRL,'user identification of private library',date,code
		// EXTENT SYSRLB,balance of extent information
		// EXEC CORGZ
		NEWVOL RI=cylin(tracks)
		COPYR cperands

	Source Statement	// ASSGN SYSSLB,X'cuu'
		// DLBL IJSYSSL,'user identification of private library',date,code
		// EXTENT SYSSLB, balance of extent information
		// EXEC CORGZ
		NEWVOL SI=cylin(tracks)
		COPYS operands

Merge System Residence to New System Residence		// ASSGN (statements as required)
		// DLBL IJSYSRS,'NEW SYSTEM RESIDENCE',date,code
		// EXTENT SYS002,balance of extent information
		// EXEC CORGZ
		MERGE RES,NRS
		COPY statements (CCPYC, COPYR, COPYS, COPYP, COPYI) as required

Merge New System Residence to System Residence		// ASSGN (statements as required)
		// DLBL IJSYSRS,'NEW SYSTEM RESIDENCE',date,code
		// EXTENT SYS002,balance of extent information
		// EXEC CORGZ
		MERGE NRS,RES
		COPY statements (CCPYI, COPYC, CCPYR, COPYS, COPYP) as required

Figure 38. Copy Function, Example (Part 3 of 5)

Copy Unit	Element	Control Statement

Merge System Residence to Private Libraries		// ASSGN (statements as required)
		// DLBL IJSYSRL,'PRIVATE RELOCATABLE LIBRARY',date,code
		// EXTENT SYSRLB,balance of extent information
		// DLBL IJSYSSL,'PRIVATE SOURCE STATEMENT LIBRARY',date,code
		// EXTENT SYSSLB,balance of extent information
		// DLBL IJSYSCL,'PRIVATE CORE IMAGE LIBRARY',date,code
		// EXTENT SYSCLB,balance of extent information
		ASSGN SYSCLB,X'cuu'
		// EXEC CORGZ
		MERGE RES,PRV
		COPY statements (CCPYI, COPYR, CCPYS, COPYC) as required

Merge New System Residence to Private Libraries		// ASSGN (statements as required)
		// DLBL IJSYSRS,'NEW SYSTEM RESIDENCE',date,code
		// EXTENT SYS002,balance of extent information
		// DLBL IJSYSRL,'PRIVATE RELOCATABLE LIBRARY',date,code
		// EXTENT SYSRLB,balance of information
		// DLBL IJSYSSL,'PRIVATE SOURCE STATEMENT LIBRARY',date,code
		// EXTENT SYSSLB,balance of extent information
		// DLBL IJSYSCL,'PRIVATE CORE IMAGE LIBRARY',date,code
		// EXTENT SYSCLB,balance of extent information
		ASSGN SYSCLB,X'cuu'
		// EXEC CORGZ
		MERGE NRS,PRV
		COPY statements (CCPYR, COPYS, CCPYC) as required

Merge Private Libraries to System Residence		// ASSGN (statements as required)
		// DLBL IJSYSPR,'PRIVATE RELOCATABLE LIBRARY',date,code
		// EXTENT SYS001,balance of extent information
		// DLBL IJSYSPS,'PRIVATE SOURCE STATEMENT LIBRARY',date,code
		// EXTENT SYS000,balance of extent information
		// DLBL IJSVSPC,'PRIVATE CORE IMAGE LIBRARY',date,code
		// EXTENT SYS003,balance of extent information
		// EXEC CORGZ
		MERGE PRV,RES
		COPY statements (CCPYR, COPYS, COPYC) as required

Figure 38. Copy Function, Example (Part 4 of 5)

Copy Unit	Element	Control Statement

Merge Private Libraries to New System Residence		// ASSGN (statements as required)
		// DLBL IJSYSRS,'NEW SYSTEM RESIDENCE',date,code
		// EXTENT SYS002,balance of extent information
		// DLBL IJSYSPR,'PRIVATE RELOCATABLE LIBRARY',date,code
		// EXTENT SYS001,balance of extent information
		// DLBL IJSYSPS,'PRIVATE SOURCE STATEMENT LIBRARY',date,code
		// EXTENT SYS000,balance of extent information
		// DLBL IJSVSPC,'PRIVATE CORE IMAGE LIBRARY',date,code
		// EXTENT SYS003,balance of extent information
		// EXEC CORGZ
		MERGE PRV,NRS
		COPY statements (CCPYR, COPYS, CCPYC) as required

Merge Private Libraries to Private Libraries		// ASSGN (statements as required)
		// DLBL IJSYSRL,'NEW PRIVATE RELOCATABLE LIBRARY',date,code
		// EXTENT SYSRLB,balance of extent information
		// DLBL IJSYSPR,'EXISTING PRIVATE RELOCATABLE LIBRARY',date,code
		// EXTENT SYS001,balance of extent information
		// DLBL IJSYSSL,'NEW PRIVATE SOURCE STATEMENT LIBRARY',date,code
		// EXTENT SYSSLB,balance of extent information
		// DLBL IJSYSPS,'EXISTING PRIVATE SOURCE STATEMENT LIBRARY',date,code
		// EXTENT SYS000,balance of extent information
		// DLBL IJSYSCL,'NEW PRIVATE CORE IMAGE LIBRARY',date,code
		// EXTENT SYSCLB,balance of extent information
		ASSGN SYSCLB,X'cuu'
		// DLBL IJSYSPC,'EXISTING PRIVATE CORE IMAGE LIBRARY',date,code
		// EXTENT SYS003,balance of extent information
		// EXEC CORGZ
		MERGE PRV,PRV
		COPY statements (CCPYR, COPYS, CCPYC) as required
		
		To define the private library in the same job step, precede MERGE with a NEWVOL statement, except for COPYC statements.

Notes:

1. // JOB, /*, and /& must be included where needed.

2. The private library can be updated with either a MAINT or a copy MERGE function.

Figure 38. Copy Function, Example (Part 5 of 5)

SYSBUFLD is a special service program that loads the UCB (Universal Character Set Buffer) and the FCB (Forms Control Buffer) for the 3203, 3211, and 5203 printers with buffer load phases. For a 5203 without the universal character set (UCS) feature, only the FCB is loaded. To load the UCB of the printers, the corresponding buffer load phases must reside in the core image library with valid phase names. SYSBUFLD is self-relocating and requires 2K of storage for its operation.

SYSBUFLD is executed in your job stream when it is necessary to change the contents of either the UCB or the FCB. This program is distinct from job control and is initiated by the statement:

```
// EXEC SYSBUFLD
```

SYSBUFLD then reads a control card from SYSIPT, which identifies the unit and the type of buffer load to be performed. The format of this card for the FCB is:

```
FCB SYSxxx[,phasename]
```

The format of the card for the UCB is:

```
UCB SYSxxx[,phasename]
    [,FOLD][,NOCHK]
    [,NULMSG]
```

Note: For each of these formats, a name in the name field must not be used.

Operation

The operation defines the type of buffer load to be performed.

FCB operation loads either a phase in a core image library or an FCB card load (on SYSIPT following the SYSBUFLD control card) into the FCB in the control unit. The EBCDIC characters of the FCB load correspond to the lines of printing for any single form. The maximum number of lines per form is 192 for 3203, 180 for 3211, and 112 for 5203. When a form-skip command is issued to the printer, forms movement is initiated. A character of the form-skip command is compared to the character in the FCB. When a match occurs, forms movement is terminated. Thus, the FCB can adapt the printer to many variable forms.

UCB operation loads the phase from a core image library into the UCB in the control unit. The UCB load corresponds to the print positions on the printer trains. A character sent to the printer for printing is matched against the character in the UCB. When a match occurs, the corresponding train character is printed in the printline position that the output character occupied. Thus, with the use of SYSBUFLD and the trains available, the printers can be adapted to many printing applications.

The following standard UCB load phases are supplied in the core image library:

Printer	Phase Name	Train Type
3203	$$BUCB3	AN
3211	$$BUCB	A11
5203	$$BUCB5	LC

Additional UCB loads (including a copy of the standard one) are supplied in the relocatable library:

Printer	Module Name	Train Type
3203	IJBTRAN	AN
	IJBTRGN	GN
	IJBTRPAN	PCS-AN
	IJBTRPHN	PCS-HN
	IJBTRPN	PN
	IJBTRQNC	QNC
	IJBTRQN	QN
	IJBTRRN	RN
	IJBTRSN	SN
	IJBTRTN	TN
	IJBTRYN	YN
	IJBTRALA	ALA
3211	IJBTRA11	A11
	IJBTRG11	G11
	IJBTRH11	H11
	IJBTRP11	P11
	IJBTRT11	T11
5203	IJBTRLC	LC
	IJBTRGN	GN
	IJBTRPN	PN
	IJBTRHN	HN

The additional UCB loads must be cataloged to a core image library before their execution. They can be assigned any valid phasename. For dualing feature support during IPL, develop your own buffer and catalog it into the core image library with

the phasename $$BUCB. (Refer to the publication IBM 3211/3216/3811 Component Description and Operating Procedures, GA24-3543, for further information on the dualing capability).

It is your responsibility to:

- Assemble, link-edit, and catalog any FCB load phases into the core image library and
- Link-edit and catalog any IBM-supplied UCSB load phases or assemble, link-edit, and catalog any user-written UCB load phases into the core image library, and
- Mount the new train before the UCB is loaded.

Operands

SYSxxx

The name of the logical unit assigned to a 3203, 3211, or 5203 printer to be loaded is SYSxxx. It must be SYSLST, SYSLOG, or a programmer logical unit.

Note: If SYSLOG is specified in the SYSBUFLD control statement, it must be assigned to a 3203, 3211, or 5203.

phasename

The core image name of the phase containing the applicable buffer load. If FCB is specified and phasename is omitted, an FCB card load from SYSIPT is assumed.

FOLD

FOLD signifies that the UCSB buffer is to be loaded with the folding operation code to permit printing of uppercase for lowercase bit configurations. FOLD is optional and only valid for UCB.

NOCHK

NOCHK prevents the data checks that are generated by the printer because of printline character mismatches with the UCSB. NOCHK is optional and only valid for UCB.

NULMSG

NULMSG signifies that the 80-character verification message is not to be printed on SYSxxx after the buffer is loaded. If NULMSG is not specified after the FCB or UCB has been loaded, the program skips to channel 1, issues a print of the last 80 characters in the phase, and again skips to channel 1. This is repeated for each message.

NULMSG is optional and only valid for UCB.

This message could identify the phase that was loaded. During a UCB load, the train of the printer could be identified by printing a unique character of the train in the message. This would ensure that the mounted train of the printer is compatible with the contents of the UCB.

How to Use SYSBUFLD

The UCB phase format for the 3211 is:

432-character UCB load	80-character field (see User Written UCB Load Phase)	80-character verification message

The UCB phase format for the 3203 and 5203 is:

240-character UCB load	80-character verification message

The FCB phase format for the 3203, 3211, and 5203 is:

nnn-character FCB load	80-character verification message

where nnn = 192 for 3203
180 for 3211
112 for 5203

Note: Other than $$BFCB (3211), $$BFCB3 (3203), and $$BFCB5 (5203), which are loaded by IPL), no additional FCB loads are supplied by IBM.

The FCB card format is:

FCB load (maximum of 112, 180, or 192 bytes)

The verification message is not allowed. Figure 39 contains examples of FCB card loads for the 3211.

```
       Cols. 1  8  11        20        29    35        45                  65              80
                |  |         |         |     |         |                   |               |
                |  |         |         |     |         |                   |               |
Card 1             1                   2               3                   4
Card 2                                             5
Card 3          C             X
       * EXAMPLE OF FCB CARD LOAD 6 LPI, 180 LINES PER PAGE

Card 1 *           1                   2               3                   4
Card 2                                             5
Card 3          C             X
       * EXAMPLE OF FCB CARD LOAD 8 LPI, 180 LINES PER PAGE. (NOTE: * IN
       * COLUMN 1 OF CARD 1.)

Card 1 *C      1             X
       * EXAMPLE OF FCB CARD LOAD FOR PRINTING 8 LPI. CHANNEL 1 IS THE FIRST
       * LINE AFTER THE PAGE PERFORATION. IT IS NECESSARY TO KEEP THE FCB
       * SYNCHRONIZED WITH THE FORM; HOWEVER, IT IS NOT NECCESSARY TO
       * INITIALLY ALIGN THE FIRST LINE OF THE PAGE WITH THE FIRST POSITION
       * OF THE FCB. THIS EXAMPLE IS FOR A FORM WITH 20 LINES PER PAGE WITH
       * PRINTING ON 14 LINES.
```

Figure 39. FCB Card Load Examples for 3211 Printer

The FCB characters for phase and card format are:

Channel Indication	Phase Format (in Hex)	SYSIPT Card Code
Null (Space)	00	blank
Channel 1	01	1
Channel 2	02	2
Channel 3	03	3
Channel 4	04	4
Channel 5	05	5
Channel 6	06	6
Channel 7	07	7
Channel 8	08	8
Channel 9	09	9
Channel 10	0A	A
Channel 11	0B	B
Channel 12	0C	C
End of FCB	1n	X
8 Lines per inch[1]	1n	* (in col. 1)

[1](Applies to 3211 only. The 3203 and 5203 have a hardware switch to indicate the line density.)

Note: Channel and End-of-Forms cannot be indicated in the same line for the 3203 or the 5203.

When the FCB phase format is used, bit position 3 (the flag bit) of any channel indication specifies the end of the buffer (for example, X'1C') and, if used for a 3211 in the first buffer position, printing is forced to 8 lines per inch (for example, X'11'). When the FCB is being loaded from SYSIPT, an X must be used to indicate the end of the buffer.

Figure 40 is an example of how to use SYSBUFLD. In the example, the first job step of each job loads the FCB from a core-image phase and the UCB.

```
// JOB ONE
// EXEC SYSBUFLD     (load the FCB and
 FCB SYSLST,PHASE1  UCSB for PROG001)
 UCB SYSLST,UCBPH001,FOLD,NOCHK,NULMSG
/*
// EXEC PROG001
/*
/&
// JOB TWO
// EXEC SYSBUFLD       (load the FCB and
 UCB SYSLST,UCBPH002  UCSB for PROG002)
 FCB SYSLST,PHASE2
/*
// EXEC PROG002
/*
/&
```

Figure 40. Example of System Buffer Load

USER-WRITTEN FCB LOAD PHASE

Figure 41 shows how PHASE001 might be defined, assembled, and cataloged to the core image library for an FCB load.

```
// JOB FCBXMPLE
// OPTION CATAL,DECK
// EXEC ASSEMBLY
 PUNCH ' PHASE   PHASE001,+0'
 START
 DC X'01' CHANNEL 1 & 1ST LINE OF PAGE *
 DC XL64'00' 64 LINES OF PAGE
 DC X'1C' CHANNEL 12 & LAST LINE PAGE
 DC XL114'00' UNUSED BUFFER POSITIONS
 DC CL80'FCB PHASE001 LOADED' MESSAGE
 END
/*
// EXEC LNKEDT
/&
```

*Note: Channel and End-of-Forms cannot be indicated in the same line for the 3203 or 5203.

Figure 41. FCB Load Program

USER-WRITTEN UCB LOAD PHASE

If your 3203, 3211, or 5203 uses a special train configuration, then you must assemble, link-edit, and catalog the UCB load phase for the special train into the core image library. The UCB load phase format for the 3211 is:

Position	Comment
1-432	Train image. The hexadecimal equivalent of all characters on the train.
433-447	Zeros.
448-511	Associative field. This is used by the 3811 Control Unit to check for invalid hexadecimal characters sent to the 3211. For a complete description of this field and how to prepare it, see IBM 3211/3216/3811 Component Description and Operating Procedures, GA24-3543.
512	Zero.
513-592	Verification message (optional).

The UCB load phase format for the 3203 and 5203 is:

Position	Comment
1-240	Train image. The hexadecimal equivalent of all characters on the train.
241-320	Verification message (optional).

SYSBUFLD MESSAGES

Appropriate messages are issued when an invalid parameter specification is made or when a required parameter is omitted. With the exception of an invalid phasename, all errors on the control card may be corrected through SYSLOG. An invalid phasename cancels the job.

SYSBUFLD UNDER POWER

POWER supports spooling of 3211 UCB and FCB load commands as given by the service program SYSBUFLD.

When jobs are executed under POWER, pages are formatted by posting channel 9 and channel 12 as specified in the LINETAB parameter of the * $$ PRT statement. (For a description of the * $$ PRT statement refer to the chapter POWER.) When the output of the job is finally printed, skip operations are performed according to the current contents of the forms control buffer. The contents of the buffer must therefore correspond to the specifications of the LINETAB parameter.

LOADING AN FCB

The contents of an FCB may be changed anywhere within a job entry. The job to load an FCB may also be submitted as a single job entry (see Submitting an FCB Load as a Separate Job Entry, below).

When a POWER writer routine prints a job entry that contains an FCB load (which has been submitted by SYSBUFLD or by any other program) no check for the forms specified in the * $$ PRT statement is performed when printing is started. All records up to the FCB load are printed on the old forms. When the FCB load is encountered in the print-line image stream, the current forms are aligned to line 1 and the forms control buffer is subsequently loaded. (Note that line 1 and the channel 1 line may be different.) The message

```
1Q80E JOB ENTRY name NEEDS FORMS ffff
      FOR xxycuu
```

is then issued to tell the operator that he has to change forms. The operator must place the fold of the new form on that fold of the old form which shows just above the print chain. The POWER writer routine enters the wait state until the operator reactivates the routine by a G command. The number 'ffff' in message 1Q80E is the number specified in the 'forms-number' parameter of the * $$ PRT statement. If

the parameter is omitted or if the job entry does not contain a * $$ PRT statement, blanks appear instead of the number in the message.

If a job entry contains more than one FCB load, the above described procedure is repeated for each FCB load, that is, the forms are aligned to line 1, the forms control buffer is loaded, and message 1Q80E is printed. The forms number given in the message is always the one specified in the * $$ PRT statement, or is blank if the * $$ PRT statement is omitted. The operator must therefore be informed which forms to use if more than one type of forms is required for a job entry.

A job entry that loads a special buffer should reset the buffer to its normal contents before the job entry is terminated. If that is not possible, the FCB may be reset by submitting a separate FCB load job entry that resets the buffer to normal contents.

Submitting an FCB Load as a Separate Job Entry

Submitting an FCB (or UCB) load as a separate job entry allows you to execute that job entry, and change the contents of the FCB (or UCB) whenever required. To do so, submit the following job entry in any partition waiting for work:

```
* $$ JOB FCB
* $$ PRT Da  (a is 'class' that contains no
             other job entries; it may be
             any alphabetical character)
// JOB FCBa
// EXEC SYSBUFLD
   FCB SYSLST,phasename
/&
* $$ EOJ
```

After execution of this job entry, a class writer should be started with the command

```
S PRT,cuu,,a
```

where cuu specifies the address of the 3211 and a is 'class'. The FCB will then be loaded as desired.

Since a partition is not always available when execution of the FCB load job entry is required (for instance, when an FCB has to be reset to its normal contents), execute such FCB load job entries in advance and put them into distinct classes of the print queue. The FCB can then be loaded at any time by starting the specific class writer. If the class writer is stopped after the message 1Q80E by a

```
P PRT,cuu
```

command instead of reactivating it with a

```
G PRT,cuu
```

command the job entry which loaded the FCB remains in the print queue and can therefore be used again if required.

LOADING A UCB

A UCB may be loaded under control of POWER by submitting the following statements anywhere within a job entry:

```
[// JOB]
 // EXEC SYSBUFLD
    UCB SYSLST,phasename,FOLD,NOCHK
[/&]
```

This job may also be submitted as a separate job entry. This is done in the same way as described above for an FCB under Submitting an FCB Load as a Separate Job Entry.

A UCB load is executed as soon as it is encountered in the print-line image stream. It does not force POWER to stop printing. However, if the UCB load is used together with an FCB load, POWER stops printing to allow the operator to mount the required print train.

Note: NOCHK must always be specified in the UCB card to avoid data checks in the print writer routine.

Appendix A contains a summary of the following:

- Job Control Statements (JCS) which must be preceded by // blank in positions 1, 2, and 3.
- Job Control Commands (JCC).
- Attention Routine Commands (AR).

The POWER statements and commands are summarized in Appendix C.

Name	Operation	Operand	Remarks
	ALLOC Valid for JCC, AR	F1=nK[,F2=nK][,F3=nK][,F4=nK]	Allocates foreground program areas in the virtual address area. Value of n is an even number F and either 0 (inactive) or a minimum of 64 (active). The order of operands is arbitrary. At least one operand must be specified.
	ALLOCR Valid for JCC, AR	BGR=nK [,F2R=nK] [,F4R=nK] [,F1R=nK] [,F3R=nK]	Allocates real address area among foreground and background programs. Value of n is zero or even number. The order of operands is arbitrary. At least one operand must be specified.
	ALTER Valid for AR	xxxxxx	Alters 1 to 16 bytes of virtual storage. xxxxxx is the hexadecimal address where alteration is to start.
[//]	ASSGN Valid for JCS, JCC	For any device SYSxxx,{X'cuu' (address-list) SYSyyy UA IGN} [,TEMP ,PERM] For disks SYSxxx,{X'cuu' (address-list) SYSyyy DISK 2311 2314 3330 3340} [,TEMP][,VOL=no][,SHR ,PERM] For diskettes SYSxxx,{X'cuu' (address-list) SYSyyy DISKETTE 3540} [,TEMP ,PERM] For tapes SYSxxx,{X'cuu' (address-list) SYSyyy TAPE 2400T7 2400T9 3410T7 3410T9 3420T7 3420T9} [,X'ss'][,TEMP][,VOL=no] [,ALT][,PERM]	SYSxxx can be SYSRDR SYSIPT SYSIN SYSPCH SYSLST SYSOUT SYSLOG SYSLNK SYSREC SYSRLB SYSSLB SYSCLB SYSnnn X'cuu': c = 0-6 uu = 00-FE (0-254) in hex address-list: a list of up to seven device addresses in the form (X'cuu',...,X'cuu') UA: unassign IGN: unassign and ignore (invalid for SYSCLB, SYSRDR, SYSIPT, and SYSIN) SYSyyy: any system or programmer logical unit device-class: READER, PRINTER, PUNCH, TAPE, DISK or DISKETTE device-type: device code of any supported device X'ss': used for magnetic tape only. ss / Bytes per inch / Parity / Translate Feature / Convert Feature 10 200 odd off on 20 200 even off off 28 200 even on off 30 200 odd off off 38 200 odd on off 50 556 odd off on 60 556 even off off 68 556 even on off 70 556 odd off off 78 556 odd on off 90 800 odd off on A0 800 even off off A8 800 even on off B0 800 odd off off B8 800 odd on off

Figure 42. Job Control Summary (Part 1 of 8)

Name	Operation	Operand	Remarks
	(ASSGN continued)	For printers SYSxxx, { X'cuu' / (address-list) / SYSyyy / PRINTER / 1403 / 1403U / 1443 / 3203 / 3211 / 5203 / 5203U } [,TEMP / ,PERM] For card (read) punches SYSxxx, { X'cuu' / (address-list) / SYSyyy / PUNCH / 1442N1 / 1442N2 / 2520B1 / 2520B2 / 2520B3 / 2540P / 2560 [,H1 / ,H2] / 2596 / 3525P / 3525RP / 5425 [,H1 / ,H2] } [,TEMP / ,PERM] For card readers SYSxxx, { X'cuu' / (address-list) / SYSyyy / READER / 1442N1 / 2501 / 2520B1 / 2540R / 2560 [,H1 / ,H2] / 2596 / 3504 / 3505 / 3525RP / 5425 [,H1 / ,H2] } [,TEMP / ,PERM]	C0 800 single density 9 track tape C0 1600 single density 9 track tape C0 1600 dual density 9 track tape C8 800 dual density 9 track tape D0 6250 single density 9 track tape D0 6250 dual density 9 track tape ALT: specifies alternate tape unit. H1: specifies input hopper one for input on 2560 or 5425. Is assumed if neither H1 nor H2 is specified. H2: specifies input hopper two for input on 2560 or 5425 (invalid for programmer units and POWER). PERM: the assignment is permanent. TEMP: the assignment is temporary. VOL=no: volume serial number of the tape or disk required. SHR: indicates the share option for disk devices.
	BATCH Valid for AR	{ BG / F1 / F2 / F3 / F4 }	Start, or continue processing. If specified partition was halted by STOP command, it is made active; same function as START command.
	CANCEL Valid for AR	{ BG / F1 / F2 / F3 / F4 }	Cancels execution of current job in specified partition.
	CANCEL Valid for JCC	blank	Cancels execution of current job.

Figure 42. Job Control Summary (Part 2 of 8)

Name	Operation	Operand	Remarks
[//]	CLOSE Valid for JCS, JCC	SYSxxx [,X'cuu' [,X'ss'] ,UA ,IGN ,ALT]	SYSxxx: for magnetic tape / for DASD (JCC only) SYSPCH / SYSIN SYSLST / SYSRDR SYSOUT / SYSIPT SYSnnn / SYSPCH X'cuu',X'ss',UA,IGN,ALT: Values as described in ASSGN command.
//	DATE Valid for JCS	mm/dd/yy or dd/mm/yy	mm: month (01-12) dd: day (01-31) yy: year (00-99)
//	DLAB Valid for JCS	'label fields 1-3', C xxxx,yyddd,yyddd,'system code'[,type]	'label fields 1-3': first three fields of Format 1 DASD file label. Is a 51-byte character string, contained within apostrophes and followed by a comma. Entire 51-byte field must be contained in the first of the two statements. Field 1 is the file name (44-byte alphameric); field 2 is the format identifier (1-byte numeric); field 3 is the file serial number (6-byte alphameric). C: any nonblank character in column 72. xxxx: volume sequence number (4-digit numeric). Must begin in column 16 of the continuation statement. Columns 1-15 are blank. yyddd,yyddd: file creation date followed by file expiration date. Each is 5-digit numeric. 'system code': not required. When used, a 13-character string, within apostrophes. type: SD, DA, ISC, or ISE. If omitted, SD is assumed.
//	DLBL Valid for JCS	filename,['file-ID'],[date], [codes],[data security] (See Note 1)	filename: one to seven alphameric characters, the first of which must be alphabetic. 'file-ID': one to forty-four alphameric characters (one to eight alphameric characters for the 3540 diskette). date: one to six characters (yy/ddd for expiration date or yyddd for retention period). codes: two to four alphabetic characters. data security: one to three characters.
	DSPLY Valid for AR	XXXXXX	Displays 16 bytes of virtual storage.
	DUMP Valid for AR	Blank S BG Fn BGS FnS PDAREA address,address [BG]* or [Fn]*	Dumps specified areas of virtual storage. *Parameter causes dump on the SYSLST assigned to the specified partition. Default is BG SYSLST. blank: general registers plus all real and virtual partitions currently occupied by programs. S: general registers, all real and virtual partitions currently occupied by programs, and supervisor area. BG,Fn: applicable real or virtual partition currently occupied by program, and associated registers. n = 1, 2, 3, or 4. BGS,FnS: applicable real or virtual partition currently occupied, registers, and supervisor area. n = 1, 2, 3, or 4. PDAREA: CE table, CE area, and AAA. address, address: start and end addresses of storage are to be dumped. Associated general registers are also dumped.

Note 1: If the DLBL and EXTENT statements for a private core image library are in the input stream (that is, the information is not contained on the label cylinder), they must precede the ASSGN SYSCLB command.

Figure 42. Job Control Summary (Part 3 of 8)

Name	Operation	Operand	Remarks
	DVCDN Valid for JCC	X'cuu'	X'cuu': c = 0-6 in hex uu = 00-FE (0-254) in hex
	DVCUP Valid for JCC	X'cuu'	X'cuu': c = 0-6 in hex uu = 00-FE (0-254) in hex
	END or ENTER Valid for JCC, AR	blank	end of SYSLOG communications END for the 3210 and 3215 printer keyboards ENTER for DOC
	ENDSD Valid for AR	blank	Terminates execution of SD aids program.
[//]	EXEC Valid for JCS and JCC	[[PGM=]progname][,REAL][,SIZE=size] PROC=procname[,OV]	PGM=progname: one to eight alphameric characters. Used only if the program is in the core image library. REAL: the respective program is to be executed in real mode. SIZE=size: can be the following: nK: size of area required AUTO: take program size (AUTO,nK): take program size plus nK. PROC=procname: name of cataloged procedure to be retrieved. One to eight alphameric characters. OV: indicates that overwrite statements follow EXEC statement.
//	EXTENT Valid for JCS	[symbolic-unit], [serial-number],[type], [sequence-number], [relative-track], [number-of-tracks], [split-cylinder-track], [B=bins] (See Note 1)	symbolic unit: six alphameric characters serial number: one to six alphameric characters type: one numeric character sequence number: one to three numeric characters relative track: one to five numeric characters number of tracks: one to five numeric characters split cylinder track: one or two numeric characters bins: one or two numeric characters
	HOLD Valid for JCC	{F1[,F2][,F3][,F4]} {F4[,F3][,F2][,F1]}	Used to deactivate a partition.
	IGNORE Valid for AR and JCC	blank	Ignore abnormal condition.
//	JOB Valid for JCS	jobname [accounting information]	jobname: one to eight alphameric characters accounting information: one to 16 characters
//	LBLTYP Valid for JCS	{TAPE[(nn)]} {NSD (nn)}	TAPE: Used when tape files requiring label information are to be processed and no nonsequential disk files are to be processed. (nn): Optional and is present only for future expansion (it is ignored by job control). NSD: Nonsequential disk files are to be processed. (nn): Largest number of extents per single file.
[//]	LISTIO Valid for JCS JCC	{SYS PROG BG Fn ALL SYSxxx UNITS DOWN UA X'cuu'}	Causes listing of I/O assignments on SYSLST for JCS and SYSLOG for JCC. Fn = Physical units assigned to all logical units of foreground partition. n = 1, 2, 3, or 4.

Figure 42. Job Control Summary (Part 4 of 8)

Name	Operation	Operand	Remarks
	LOG Valid for JCC AR	blank	Causes logging of job control statements on SYSLOG.
	MAP Valid for JCC AR	blank	Produces (on SYSLOG) storage areas allocated to partitions.
	MODE Valid for AR	{ IR CR CE,cuu [,I[,xx,y]] [,D[,xx,y]] [,N] R STATUS HIR ECC[,M] [,C] *{[,R] [,Q] [,TH]} [,E=eeee] [,T=tttt] * }	Changes the mode of operation, changes the EFL threshold values, and gives status information. *Note: When HIR or ECC is specified, at least one of the optional operands must be selected. TH is only valid for the Model 145 when ECC,C is specified with the MODE command.
	MSG Valid for AR	{ BG F1 F2 F3 F4 }	Transfer control to an operator communications routine of a particular partition previously activated by a STXIT command.
[//]	MTC Valid for JCS JCC	opcode, { SYSxxx X'cuu' } [,nn]	opcode: BSF, BSR, DSE, ERG, FSF, FSR, REW, RUN, or WTM. SYSxxx: any logical unit. X'cuu': (Only valid for JCC) c = 0-6, uu = FE (0-254) in hex nn: decimal number (01-99).
	NEWVOL Valid for AR	[BG / Fn]	Indicates that a new volume has been mounted for the specified partition. Fn can be specified as F1, F2, F3, or F4.
	NOLOG Valid for JCC AR	blank	Suppresses logging of job control statements and commands on SYSLOG, except ALLOC, ALLOCR, DVCDN, DVCUP, EOJ (/&), EOP (/+), HOLD, JOB, MAP, PAUSE,* and STOP. AR affects all partitions in which NOLOG is issued.
//	OPTION Valid for JCS	option 1[,option 2...]	option: can be any of the following LOG Log control statements on SYSLST NOLOG Suppress LOG option DUMP Dump registers and temporary real or virtual partition on SYSLST in the case of abnormal program end NODUMP Suppress DUMP option LINK Write output of language translator on SYSLNK for linkage editing NOLINK Suppress LINK option DECK Output object module on SYSPCH NODECK Suppress DECK option EDECK Punch source macro definitions on SYSPCH NOEDECK Suppress EDECK option ALIGN Align constants and data areas on boundaries NOALIGN Suppress ALIGN option LIST Output listing of source module on SYSLST NOLIST Suppress LIST option LISTX Output listing of object module on SYSLST NOLISTX Suppress LISTX option SYM Punch symbol deck on SYSPCH NOSYM Suppress SYM option XREF Output symbolic cross-reference list on SYSLST NOXREF Suppress XREF option ERRS Output listing of all errors in source program on SYSLST NOERRS Suppress ERRS option ACANCEL Cancel job if attempt to assign device is unsuccessful

Figure 42. Job Control Summary (Part 5 of 8)

Name	Operation	Operand	Remarks
	(OPTION continued)		NOACANCEL Await operator action if a device cannot be assigned CATAL Catalog program or phase in core image library after completion of Linkage Editor run STDLABEL Causes all DASD or tape labels to be written on the standard label track USRLABEL Causes all DASD or tape labels to be written on the user label track PARSTD Causes all DASD or tape labels to be written on the partition standard label track 48C 48 - character set 60C 60 - character set SYSPARM='string' specifies a value for assembler system variable symbol and SYSPARM
[//]	OVEND Valid for JCS, JCC	[comments]	Indicates end of overwrite statements for a cataloged procedure.
[//]	PAUSE Valid for JCS	[comments]	Causes pause immediately after processing this statement. PAUSE statement is always printed on SYSLOG. If no 3210, 3215, or DOC is available, the statement is ignored.
	PAUSE Valid for AR, JCC	{BG / F4 / F3 / F2 / F1} [,EOJ]	Causes pause at end of current job step or at end of job.
	PRTY Valid for AR	[P1,...,Pn]	P = BG, F1, F2, F3, F4. Allows the operator to display or change the priority of partitions.
[//]	RESET Valid for JCS JCC	{SYS / PROG / ALL / SYSxxx}	Resets I/O device assignments. SYSxxx: SYSIN or SYSOUT cannot be specified.
	ROD Valid for JCC	blank	Causes all SDR counters for all nonteleprocessing devices on the recorder file on SYSREC to be updated from the SDR counters in storage.
//	RSTRT Valid for JCS	SYSxxx,nnnn[,filename]	SYSxxx: symbolic unit name device on which the checkpoint records are stored. Can be SYSnnn. nnnn: four character identification of the checkpoint record to be used for restarting. filename: symbolic name of the DASD file to be used for restarting.
	SET Valid for JCC	[,UPSI=n1][,LINECT=n2] [,RCLST=n3][,RCPCH=n4] [,RF=n5][,DATE=n6] [,HC=n7][,SVA=n8][,SDL=n9]	Note: The order of the operands is arbitrary. n1 = 1 to 8 digits of 0, 1, or X. (X = ignore; unspecified rightmost positions are assumed to be X.) n2 = standard number of lines (30-99) for output on each page of SYSLST. n3 = decimal number (default = 1000) indicating minimum number of SYSLST disk records remaining to be written before operator warning. n4 = decimal number (100-65535) indicating minimum number of SYSPCH disk records remaining to be written before operator warning. n5 = {YES / CREATE} defines status of recorder file (IJSYSRC) on SYSREC. n6 = {mm/dd/yy / dd/mm/yy} date defaults to system generation mm: month (01-12) dd: day (01-31) yy: year (00-99)

Figure 42. Job Control Summary (Part 6 of 8)

Name	Operation	Operand	Remarks
	(SET continued)		n7 = {YES / NO / CREATE} YES: Hard copy file exists. NO: No recording performed. CREATE: Creates a hard copy file. n7 defines the status of the hard copy file on the Model 125 SYSREC. n8 = storage size in the format (nK,nK) for SVA and GETVIS area, respectively. n9 = specify CREATE to have the system directory list (SDL) built in the SVA.
	START Valid for AR	[BG / F1 / F2 / F3 / F4]	BG: Job control reads next control statement from SYSLOG. F1-F4: Specifies that an inactive or stopped foreground partition is to be started. (See also BATCH command.)
	STOP Valid for JCC	blank	Indicates that there are no more jobs to be executed in partition specified. Not valid in a single partition system.
//	TLBL Valid for JCS	filename,['file-ID'],[date], [file-serial-number], [volume-sequence-number], [file-sequence-number], [generation-number], [version-number] Note : For ASCII file processing the fourth and fifth operands are called set identifier and file section number, respectively.	filename: one to seven alphameric characters, the first of which must be alphabetic. 'file-ID': one to 17 alphameric characters. date: one to six numeric characters (yy/ddd or dddddd). {[file serial number (EBCDIC): one to six alphameric characters] / [set identifier (ASCII): six alphameric characters]} {[volume sequence number (EBCDIC)] / [file section number (ASCII)]} one to four numeric characters file sequence number: one to four numeric characters. generation number: one to four numeric characters. version number: one to two numeric characters.
//	TPLAB Valid for JCS	{'label fields 3-10' / 'label fields 3-13' C}	'label fields 3-10': Indicated fields of the standard tape file label for either EBCDIC or ASCII files. A 49-byte character string, contained within apostrophes. 'label fields 3-13': Same as above, except that character string is 69 bytes long, requiring a continuation character in column 72 of first line. C: Any nonblank character in column 72.
	UCS Valid for JCC	SYSxxx,phasename[,FOLD][,BLOCK][,NULMSG]	Causes the 240-character universal character set contained in the core image library phase specified by phasename to be loaded as buffer storage in the IBM 2821 Control Unit. If SYSxxx is assigned to a 1403 or 5203 printer, the UCS feature must be present.
	UNBATCH Valid for JCC	blank	Terminates foreground processing.
//	UPSI Valid for JCS	nnnnnnnn	n: one to eight characters of 0, 1, or X. Unspecified rightmost positions are assumed to be X.
//	VOL Valid for JCS	SYSxxx,filename	SYSxxx: symbolic unit name. filename: one to seven alphameric characters, the first of which must be alphabetic

Figure 42. Job Control Summary (Part 7 of 8)

Name	Operation	Operand	Remarks
//	XTENT Valid for JCS	type sequence,lower,upper 'serial no.',SYSxxx[,B_2]	type: 1 for data area (no split cylinder) 2 for overflow area (for indexed sequential file) 4 for index area (for indexed sequential file) 128 for data area (split cylinder) sequence: sequence number of extent within multiextent file. Can be 0 to 255. lower: lower limit of extent in the form $B_1C_1C_1C_2C_2H_1H_2H_2$ where: B_1 = 0 for 2311 or 2314/2319; 0-9 for 2321 C_1C_1 = 00 for 2311 or 2314/2319; 00-19 for 2321 $C_2C_2C_2$ = 000-199 for 2311 or 2314/2319, 000-009 for 2321 H_1 = 0 for 2311 or 2314/2319; 0-4 for 2321 H_2H_2 = 00-09 for 2311; 00-19 for 2321 or 2314/2319. Note that the last four strips of subcell 19 are reserved for alternate tracks for 2321. upper: upper limit of extent in the same form as for lower limit. 'serial no.': 6-alphameric-character volume serial number contained within apostrophes. SYSxxx: symbolic unit name. B_2: 0 for 2311 or 2314/2319; 0-9 for 2321.
//	ZONE Valid for JCS	{EAST / WEST} /hh/mm	EAST: A geographical position east of Greenwich. WEST: A geographical position west of Greenwich. hh: A decimal value in the range 0-12. mm: A decimal value in the range 0-59.
/+	Valid for JCS	[comments]	Indicates end of procedure.
/*	Valid for JCS	ignored	Indicates end of data.
/&	Valid for JCS	[comments]	Indicates end of job (EOJ).
*	Valid for JCS	comments	Comment card. Column 2 must be blank.

Figure 42. Job Control Summary (Part 8 of 8)

Name	Operation	Operand	Remarks
	START valid for: AR	{ BG / F1 / F2 / F3 / F4 }	BG: Job control reads next control statement from SYSLOG F1-F4: Specifies that an inactive or stopped foreground partition is to be started. (See also BATCH command)
	STOP valid for: JCC	blank	Indicates that there are no more jobs to be executed in partition specified. Not valid in a single partition system.
//	TLBL valid for: JCS	filename, ['file-ID'], [date], [file serial number], [volume sequence number], [generation number], [version number] Note: For ASCII file processing the fourth and fifth operands are called set identifier and file section number, respectively.	filename: one to seven alphameric characters, the first of which must be alphabetic 'file-ID: one to seventeen alphameric characters date: one to six numeric characters (yy/ddd or dddddd) { [file serial number (EBCDIC): one to six alphameric characters] / [set identifier (ASCII): six alphameric characters] } { [volume sequence number (EBCDIC)] / [file section number (ASCII)] } one to four numeric characters file sequence number: one to four numeric characters generation number: one to four numeric characters version number: one to two numeric characters
//	TPLAB valid for: JCS	{ 'label fields 3 - 10' / 'label fields 3 - 13' C }	'label fields 3 - 10': Indicated fields of the standard tape file label for either EBCDID or ASCII files. A 49-byte character string, contained within apostrophes. 'label fields 3 - 13': Same as above, except that character string is 69 bytes long, requiring a continuation character in col. 72 of first line. C: Any nonblank character in column 72
	UCS valid for: JCC	SYSxxx,phasename [,FOLD] [,BLOCK] [,NULMSG]	Causes the 240-character universal character set contained in the core image library phase specified by phasename to be loaded as buffer storage in the IBM 2821 Control Unit. If SYSxxx is assigned to a 1403 or 5203 printer, the UCS feature must be present.
	UNBATCH valid for: JCC	blank	Terminates foreground processing.

Figure 42. Job Control Summary (Part 8 of 9)

Name	Operation	Operand	Remarks
//	UPSI valid for: JCS	nnnnnnnn	n: one to eight characters of 0, 1, or X. Unspecified rightmost positions are assumed to be X.
//	VOL valid for: JCS	SYSxxx, filename	SYSxxx: symbolic unit name filename: one to seven alphameric characters, the first of which must be alphabetic
//	XTENT valid for: JCS	type sequence, lower, upper 'serial no.', SYSxxx [,B_2]	type: 1 for data area (no split cylinder) 2 for overflow area (for indexed sequential file) 4 for index area (for indexed sequential file) 128 for data area (split cylinder) sequence: sequence number of extent within multiextent file. Can be 0 to 255. lower: lower limit of extent in the form $B_1C_1C_1C_2C_2H_1H_2H_2$ where: B_1 = 0 for 2311 or 2314/2319; 0 - 9 for 2321 C_1C_1 = 00 for 2311 or 2314/2319; 00 - 19 for 2321 $C_2C_2C_2$ = 000-199 for 2311 or 2314/2319, 000-009 for 2321 H_1 = 0 for 2311 or 2314/2319; 0-4 for 2321 H_2H_2 = 00-09 for 2311; 00-19 for 2321 or 2314/2319, Note that the last 4 strips of subcell 19 are reserved for alternate tracks for 2321. upper: upper limit of extent in the same form as for lower limit. 'serial no.': 6-alphameric-character volume serial number contained within apostrophes. SYSxxx: symbolic unit name B_2: 0 for 2311 or 2314/2319; 0 - 9 for 2321
//	ZONE valid for: JCS	{EAST / WEST} /hh/mm	EAST: A geographical position east of Greenwich. WEST: A geographical position west of Greenwich. hh: A decimal value in the range 0-12. mm: A decimal value in the range 0-59.
/+	valid for: JCS	[comments]	Indicates end of procedure.
/*	valid for: JCS	ignored	Indicates end of data.
/&	valid for: JCS	[comments]	Indicates end of job (EOJ)
*	valid for: JCS	comments	Comment card. Column 2 must be blank.

Figure 42. Job Control Summary (Part 9 of 9)

FORMAT OF THE ESD CARD

Card Columns	
1	Multiple punch (12-2-9). Identifies this as a loader card.
2 - 4	ESD -- External Symbol Dictionary card.
11 - 12	Number of bytes of information contained in this card.
15 - 16	External symbol identification number (ESID) of the first SD, PC, CM or ER on this card. Relates the SD, PC, CM or ER to a particular control section.
17 - 72	Variable information. 8 positions - Name 1 position - Type code hex '00', '01', '02', '04', '05', or '0A' to indicate SD, LD, ER, PC, CM, or WX, respectively. 3 positions - Assembled origin 1 position - Blank 3 positions - Length, if an SD-type, CM-type, or a PC-type. If an LD-type, this field contains the external symbol identification number (ESID) of the SD containing the label.
73 - 80	May be used by the programmer for identification.

FORMAT OF THE TXT CARD

Card Columns	
1	Multiple punch (12-2-9). Identifies this as a loader card.
2 - 4	TXT -- Text card.
6 - 8	Assembled origin (address of first byte to be loaded from this card).
11 - 12	Number of bytes of text to be loaded.
15 - 16	External symbol identification number (ESID) of the control section (SD or PC) containing the text.
17 - 72	Up to 56 bytes of text -- data or instructions to be loaded.
73 - 80	May be used for program identification.

FORMAT OF THE RLD CARD

Card Columns	
1	Multiple punch (12-2-9). Identifies this as a loader card.
2 - 4	RLD -- Relocation List Dictionary card.
11 - 12	Number of bytes of information contained in this card.
17 - 72	Variable information (multiple items). a. Two positions - (relocation identifier) pointer to the ESID number of the ESD item on which the relocation factor of the contents of the address constant is dependent. b. Two positions - (position identifier) pointer to the ESID number of the ESD item on which the position of the address constant is dependent. c. One position - flag indicating type of constant, as follows:

Bits	
0-2	ignored
3	0 - a nonbranch type load constant
	1 - a branch type load constant
4-5	00 - load constant length = 1 byte
	01 - load constant length = 2 bytes
	10 - load constant length = 3 bytes

11 - load constant length = 4 bytes

6 0 - relocation factor is to be added

1 - relocation factor is to be subtracted

7 0 - Next load constant has different R and P identifiers; therefore, both R and P must be present.

1 - Next load constant has the same R and P identifiers; therefore they are both omitted.

Five significant bits of this byte are expanded in the RSERV printout.

d. Three positions - assembled origin of load constant.

73 - 80 May be used for program identification.

FORMAT OF THE END CARD

Card Columns	
1	Multiple punch (12-2-9). Identifies this as a loader card.
2 - 4	END
6 - 8	Assembled origin of the label supplied to the assembler in the END card (optional).
15 - 16	ESID number of the control section to which this END card refers (only if 6-8 present).
17 - 22	Symbolic label supplied to the assembler if this label was not defined within the assembly.
29 - 32	Control section length (if not specified in last SD or PC).
73 - 80	Not used.

FORMAT OF THE REP (USER REPLACE) CARD

Card Columns	
1	Multiple punch (12-2-9). Identifies this as a loader card.
2 - 4	REP -- Replace text card.
5 - 6	Blank.
7 - 12	Assembled address of the first byte to be replaced (hexadecimal). Must be right justified with leading zeros if needed to fill the field.
13	Blank.
14 - 16	External symbol identification number (ESID) of the control section (SD) containing the text (hexadecimal). Must be right justified with leading zeros if needed to fill the field.
17 - 70	From 1 to 11 4-digit hexadecimal fields separated by commas, each replacing two bytes. A blank indicates the end of information in this card.
71 - 72	Blank.
73 - 80	May be used for program identification.

Figures 43, 44, and 45 summarize the following statements and commands in alphabetical order:

1. POWER Job Entry Control Language (JECL)
2. Central Installation Operator Commands
3. POWER RJE Terminal Commands.

ID Operation	Operand	Remarks
* $$ DATA	name	Specifies the name of the corresponding * $$ DATA statement in the SLI book where data is to be inserted.
* $$ EOJ	(no operand)	Indicates the end of a job entry.
* $$ JOB	[name],[H],[priority] [BG] [F4] [F3] [F2] [F1] [,[termid] [,[userid] [,[ALLUSERS]]	Indicates the beginning of a job entry and provides job entry handling information. priority = 0 through 9 (9 = highest priority termid, userid, ALLUSERS = RJE only
$$ PRT	[disposition[class]] ,[forms-number] [,[number-of-copies] [,[devaddr-of-tape] ,[lines-before-msg] ,[linetab]	Provides disposition and handling information for printed output. disposition: D = spool to disk T = spool to tape N = do not intercept H = hold until requested R = return to terminal. class = A through Z. forms-number = 1 - 4 alphameric characters number-of-copies = 0 thorugh 99 devaddr-of-tape = cuu lines-before-msg = 1 - 6 digits.
* $$ PUN	[disposition[class]] ,[card-number] ,[number-of-copies] [devaddr-of-tape] , number-of-copies , cards-before-msg	Provides disposition and handling information for punched output. disposition and card : see * $$ PRT card-number = 1 - 4 alphameric characters card-number = 1 - 4 alphameric characters. number-of-copies = 0 through 99 devaddr-of-tape = cuu cards-before-msg = 1 - 6 digits.
* $$ RDR	[SYSnnn],[filename] ,[vols],[S]	Causes a POWER reader routine to insert a 3540 diskette file into the input being read from a card reader. The diskette file can contain data and/or job control statements.
* $$ SLI	[sublibrary.]bookname	Specifies the book on the source statement library to be inserted in the job stream. May be followed by one or more SLI update cards (see below).
SLI update cards are identified by $SLI in columns 73-76 and are used as follows: Column 77 : A = insert card after SLI book card with same sequence number (78-80) B = insert card before SLI book card with same sequence number (78-80) D = delete SLI book card with same sequence number (78-80). any other code = replace SLI book card with same sequence number (78-80) or insert card in job stream.		

Figure 43. Summary of JECL Statements

Operation	Operand	Remarks
A	xxyyy,name[number],priority-n	Alters priority of job entry in a specified queue tc priority n(n = 0 to 9).
B	M,{termid / userid / ALLUSERS},'msg'	Brcadcast M = Send a message to a specific user or to all terminal users (ALLUSERS).
B	L,{termid[,nr] / userid[,nr] / ALLUSERS[,nr] / ALL}	L = Delete messages(s) for a specific user cr all messages. (nr = 1 to 99)
B	D,{termid[,nr] / userid[,nr] / ALLUSERS[,nr]}	D = Display message(s) for a specific terminal user or ALLUSERS. (nr = 1 to 99)
C	[xx]yyy[,cuu]	Cancels a reader/writer rcutine
C	cuu	
D	xxyyy, {name[,number] / ALL / HOLD / FREE / Pn / RJE / LOCAL / CLASSz}	Displays status in specified queue of: a specific jcb entry. ALL jcb entries. all job entries in hold status. all jcb entries not in hold status. all jcb entries with priority n. (n = 0 to 9) all lccal job entries. all RJE job entries. all jcb entries with class z. (z = A to Z)
D	A	active reader, writer, and RJE routines.
D	B	available program and data buffers.
D	Q	free JCT records and track groups.
D	T	system time and date.
E	(no-operand)	Ends POWER system partition.
E	KILL	Cancels POWER system partitiocn and POWER supported partitiocn(s) and issues DUMP.
F	[xx] PRT ,[cuu] PUN	
F	[xx] PRT ,[cuu][,ALL] PUN	Flushes a writer routine.
F	cuu[,ALL]	
G	[xx]yyy[,cuu]	Go Reactives reader/writer rcutine.
G	cuu	
G	xx	Reactivates
G	RJE,cuu	Reactivates RJE rcutine.
H	xxyyy, {name[,number] / ALL / Pn}	Holds in the specified queue: a specific jcb entry. ALL job entries. all jcb entries with priority n (n = 0 to 9).

Figure 44. Summary of Central Installatiocn Operator Ccmmands (Part 1 cf 3)

Operation	Operand	Remarks
I	U,userid	Inquire about RJE status for: a specific userid
I	T,termid	a specific termid.
I	L,cuu	a specific line.
I	ALL	ALL valid terminal designations.
J	cuu	Job Accounting only valid if ACCOUNT = YES generated. Punches ACCTFIL records to card unit cuu and delete ACCTFIL.
J	ttt	Writes ACCTFIL records to tape unit ttt and deletes ACCTFIL.
J	DEL	Deletes ACCTFIL.
L	xxyyy, {name[,number] / ALL}	Deletes from the specified queue: a specific job entry. ALL jcb entries.
M	[xx] {PRT ,[cuu][,nn] / PUN}	Multiple Copy Alters/displays copy counter.
M	cuu[,nn]	nn = additional copy value (1 to 99)
O	name,[number], {userid / ALLUSERS / LCCAL [,PRT] [,PUN]}	Changes output destination of a job entry to a specific user, to a local output device or to all terminal users on a read only basis (ALLUSERS).
P	[xx]yyy[,cuu]	Stops a reader/writer routine.
P	[xx]yyy,[cuu],ECJ	an RJE routine.
P	cuu	
P	[xx]yyy,[cuu],CHECKPOINT	
P	cuu[,CHECKPOINT]	
P	RJE,cuu	
R	xxyyy, {name[,number] / ALL / Pn}	Releases from the specified queue: a specific job entry. ALL jcb entries. all jcb entries with priority n. (n = 0 to 9).
S	[xx]RDR,[cuu][,b]	Starts a reader routine.
S	[xx]PRT,[cuu][,b]	a printer routine.
S	[xx]PUN,[cuu][,bp]	a punch routine.
S	[xx]PUN,[cuu],[b] ,RESTART	a punch routine from a checkpoint.
S	[xx]RDR,[cuu],[b] ,['file'],[vols],[S]	a reader routine for diskette input.
S	[xx]RDR,cuu,[b],cuu	a reader routine for card reader/diskette input.
S	[xx] {PRT / PUN},[cuu],[b / bp],{ttt / zzzz}	a tape writer. a class writer.
S	RJE,cuu{,2770 / ,2780 / ,3780}	an RJE routine. an RJE simulator routine.
S	RJE,cuu,{2770 / 2780 / 3780},2540,cuu	

Figure 44. Summary of Central Installation Operator Commands (Part 2 of 3)

Operation	Operand	Remarks
T	[xx]PRT[,cuu]	Restarts print writer routine.
T	[xx]PRT,[cuu],count cuu[,count]	count = {+1 to +999 / -1 to -999 / 1 to 999} pages
Z	DUMP, {TIB[,DFL][,QFL] / QFL[,TIB][,DFL] / DFL[,QFL][,TIB]}	Trace Writes contents of TIB or monitors queue file and data file operations in wrap-around buffer.
Z	TRACE, {SVC / TSK[,SVC]}	SVC or task selection trace.
Z	{DUMP / TRACE} ,LST	Lists status of diagnostic operations on SYSLOG.
Z	{DUMP / TRACE} ,END	Terminates diagnostic operations.

Legend

xx	= BG, F4, F3, F2, F1
yyy	= RDR, PRT, or PUN
cuu	= Unit record or RJE physical device address
ttt	= tape physical address (cuu)
zzzz	= class(es) to be assigned to a writer routine (one to four alphabetic)
b	= 1 or 2 (number of I/O buffers)
p	= 0,1 or 2 (pause code)
nr	= 1 to 99 (message number)
name	= 1 to 8 alphabetic (job entry name
number	= 1 to 5 numeric (job entry number)

- Uppercase letters and punctuation marks must be coded as shown except for braces and brackets.
- Lowercase letters represent variables for which specific values must be substituted.
- Items or groups within brackets [] are optional; use one or none.If one of the items is underlined, it is assumed when none is coded.
- Braces {} group alternative items. Choose one or none. None may be choosen only if one of the group is underlined. That is the default.

Figure 44. Summary of Central Installation Operator Commands (Part 3 of 3)

ID	Operation	Operand	Remarks
* ..	BRDCSTR	no operand	Requests broadcast messages.
* ..	CONTINUE	[BEGIN] [NC] [HOLD] [LOCAL] [PAGE[,count]] (nc operand)	Requests discontinued output from beginning. Deletes output for the job entry. Holds output for the job entry. Changes destination to local writer. Pages forward or backward printed output. count={+ 1 to + 999 / - 1 to - 999 / 1 to 999} pages Resumes with interrupted data block.
* ..	DELETE	xxyyy, name[,number] ALL	Deletes from the specified queue: a specific job entry. ALL job entries.
* ..	LOGOFF	(nc operand)	Terminates a user session.
* ..	LOGON	userid	Begins a user session.
* ..	MSGR	M,'text'	Sends message to central operator.
* ..	OUTPUT	[name[,number]] [ALL] [ALLUSERS]	Requests output of specific job entry. ALL output for userid. All output for ALLUSERS.
* ..	RJEND	(nc operand)	Detaches a terminal.
* ..	RJSTART	termid,[BRDCST],[type], [bufsize],[NOPUNCH]	Attaches a terminal.
* ..	STATUS	xxyyy[, name[,number] ,ALL ,HOLD ,Pn ,ALLUSERS]	Displays status in the specified queue of: a specific job entry. 'ALL' job entries. all job entries in hold status. all job entries with priority n (n= 0 to 9). all job entries for 'ALLUSERS'.

Legend

xx = BG, F4, F3, F2, F1
yyy = RDR, PRT, or PUN
name = 1 to 8 alphabetic (job entry name)
number= 1 to 5 numeric (job entry number)

- Uppercase letters and punctuation marks must be coded as shown except for brackets.
- Lowercase letters represent variables for which specific values must be substituted.
- Items or groups within brackets [] are optional; use one or none. If one of the items is underlined, it is assumed when none is coded.

Figure 45. Summary of RJE Terminal Commands

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This publication makes reference to the following publications:

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DOS/VS Tape Labels, GC33-5374

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DOS/VS System Control Statements (S370-36) Printed in U.S.A. GC33-5376-1

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This Technical Newsletter, a part of release 29 of the IBM Disk Operating System/Virtual Storage, provides replacement pages for your publication. These replacement pages remain in effect for subsequent DOS/VS releases unless specifically altered. Pages to be inserted and/or removed are:

Cover, 2	117,118
11-14	127,128
19-28	135,136
31-34	139-142
37-40	147-150
43,44	153,154
47-50	169-178
101,102	

A change to the text or to an illustration is indicated by a vertical line to the left of the change.

Summary of Amendments

Technical and editorial changes have been made primarily to the chapter and appendix concerning job control. Minor corrections have also been made to the chapters on IPL, linkage editor, and librarian.

Note: *Please insert this page in your publication to provide a record of changes.*

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