IBM

System/370

Operator's Reference Guide

First Edition July 1974

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PREFACE

This guide is designed as a handy, quick reference for System 370 operators of all levels and models. It includes a problem determination chart, S/370 general information, CPU manual procedures for Models 115 to 195, operator commands for the various operating systems, IPL procedures for DOS/VS and VS1 and VS2, I/O information (status and sense data, restart procedures, operating hints), utilities information, a glossary, bibliography, and index.

Since its purpose is to serve as a quick reference--a memory jogger to the operator in a dynamic, operating situation-- its content is slanted toward translation of code (bit information such as condition codes, status and sense bytes, etc.); command and record formats; operating procedures; and error restart procedures.

System 370 models embrace different kinds of hardware components and input/output units. The problem determination chart in the front of the guide is a generalized procedure for isolating trouble in the S/370. Once the malfunctioning unit has been isolated, flow charts for checking out that unit can be found in the relevant Operating Procedures SRL.

CPU manual procedures, by model, are provided in Section 3. The procedure for loading a secondary nucleus and the hard stop procedure are new in the guide. The rest of the procedures parallel those provided in the S/360 Operator's Reference Guide.

Depending on the operating system generated, S/370 operators use a variety of commands. OS/VS operators use VS1 and VS2 commands; DOS/VS operators use DOS/VS and POWER commands; VM/370 operators, CP and CMS commands; remote workstation operators, RES commands; and so on. In other words, each operator uses the commands suitable to his computer, operating system, and operator assignment. Section 4 contains the command formats for the various operating systems and operator consoles, and for remote as well as central CPU operators.

I/O status and sense byte information is summarized in Section 5. For the most part, only the first six bytes are shown, since these are all that concern the operator; the remaining bytes are of interest to the field engineer. Complete status and sense byte information usually appears in the Component Description SRL. For some of the smaller systems, however, status and sense information on I/O devices is presented in the Functional Characteristics SRL.

Of necessity, the information in this guide is highly condensed. Complete information is provided in the SRLs. To save the operator time we have noted the source of all information in this guide in order to steer him directly to the proper SRL. If the source appears just once, as at the beginning of Section 2, this means that all the information in that section comes from that single source. The titles of the source publications can be found in Bibliography 1, a numerically ordered list of all publications cited in this guide. Bibliography 2 lists publications not quoted from directly, is more comprehensive, and is arranged by subject matter.

Since this is an operator's guide, we have included only information which concerns the operator. For programming and field engineering information, consult the OS/VS Programmer's Reference Digest, the DOS/VS Handbook, and the FE Handbook.

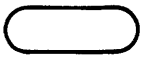
Finally, a word of caution. For release-dependent information, check the appropriate SRL to determine whether the information contained in this guide has changed as a result of the new release. As of the date of publication, operator commands are current for OS/VS1 Release 3, OS/VS2 Release 2, VM/370 Release 2, and DOS/VS Release 29.

Table of Contents

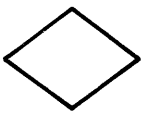
Section 1 Contents

Problem Determination

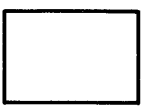
DEFINITION OF SYMBOLS USED IN FLOW CHARTS



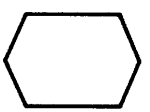
Starting or terminating step.



Question block which is asking for a "yes - no" or "on - off" answer. Output lines will be labeled.



Indicates some action is required or gives a brief description of situation.

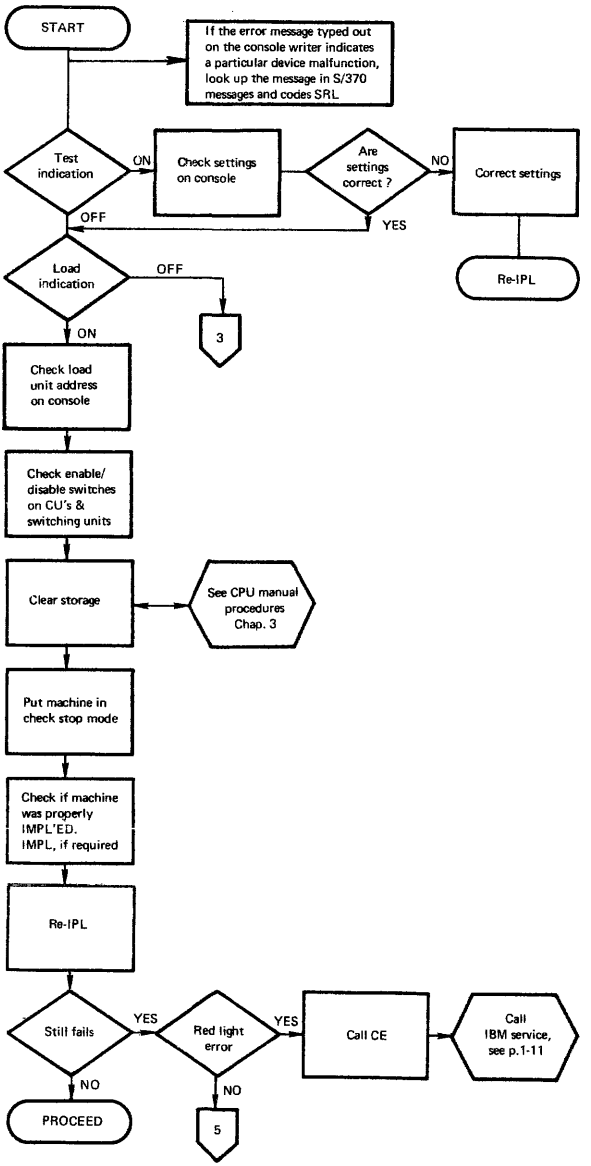


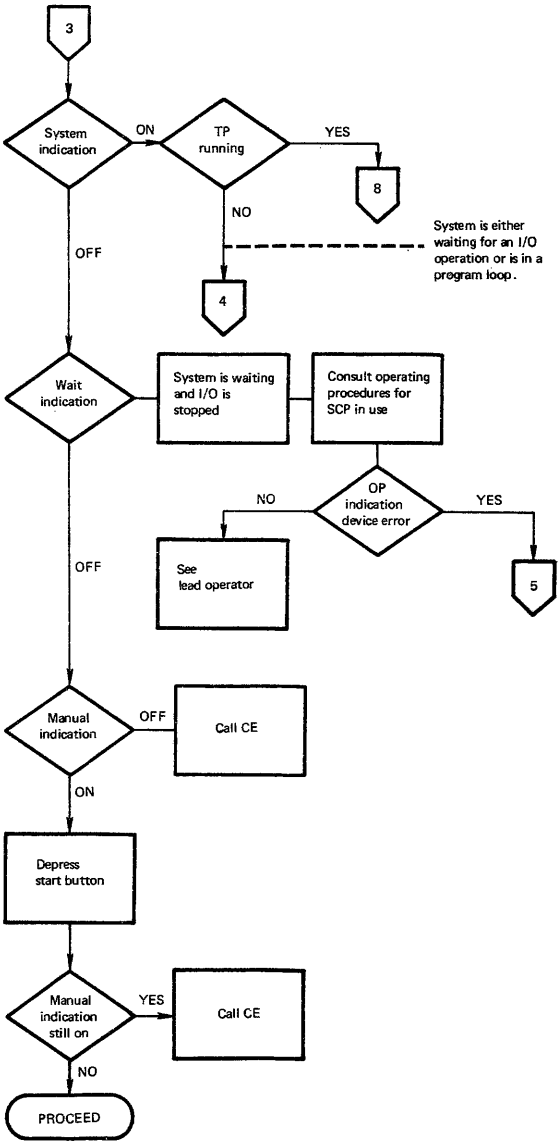
Refers reader to some other page for directions of particular operator action required.

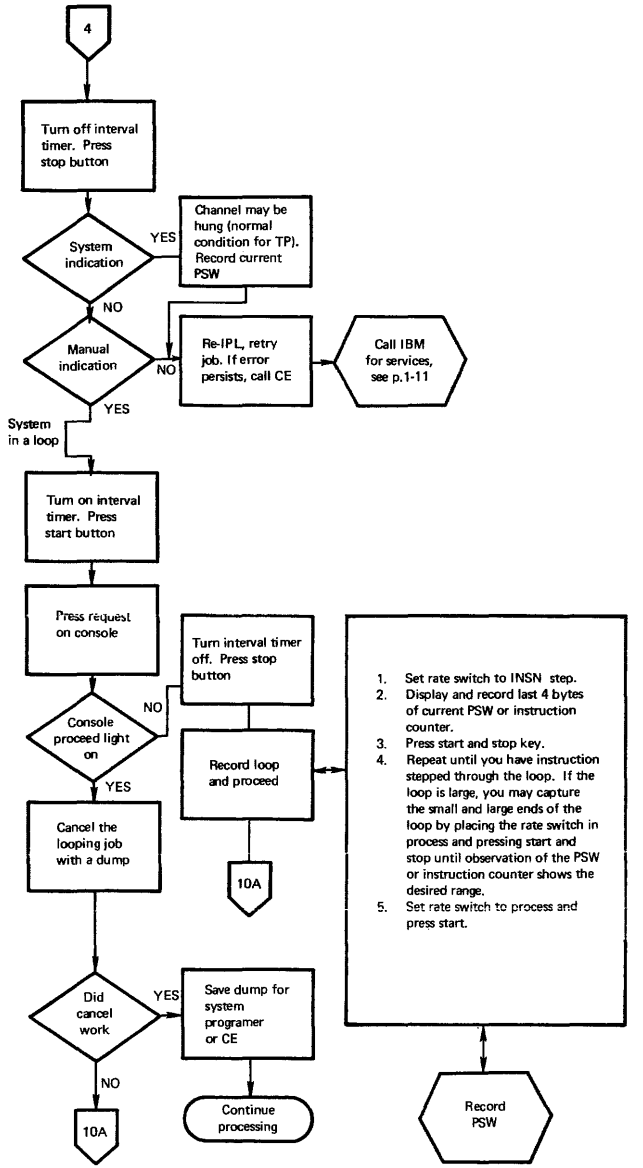
Number within this symbol indicates one of the following:

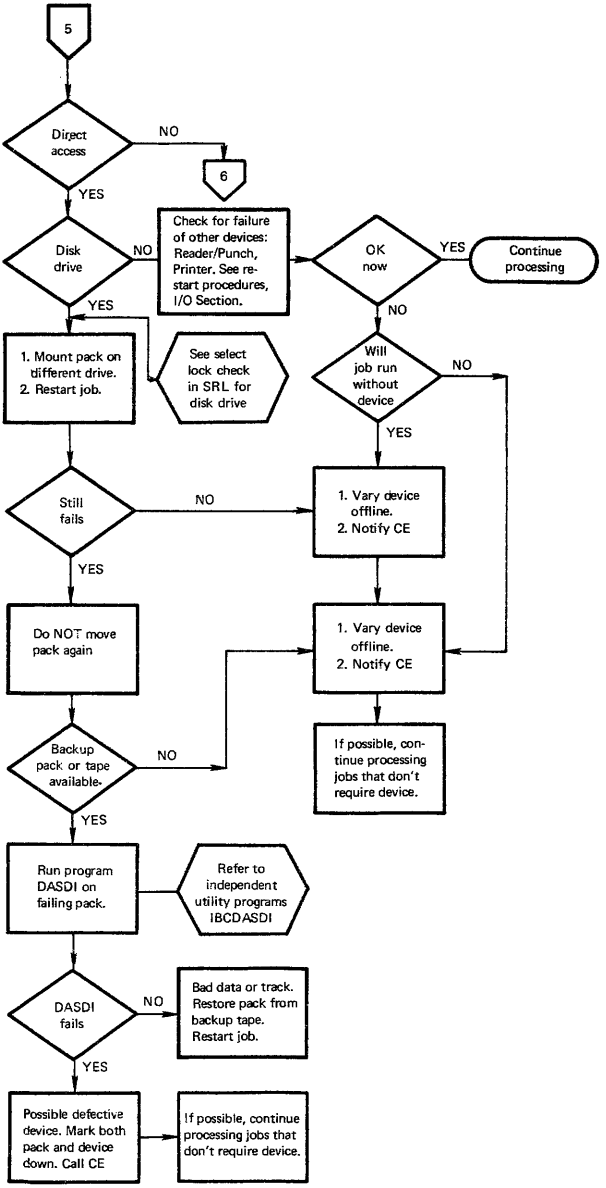
1. Page number which references this page.
2. This page number, if this is a common entry from several other pages
3. Page to exit to in order to continue usage of charts

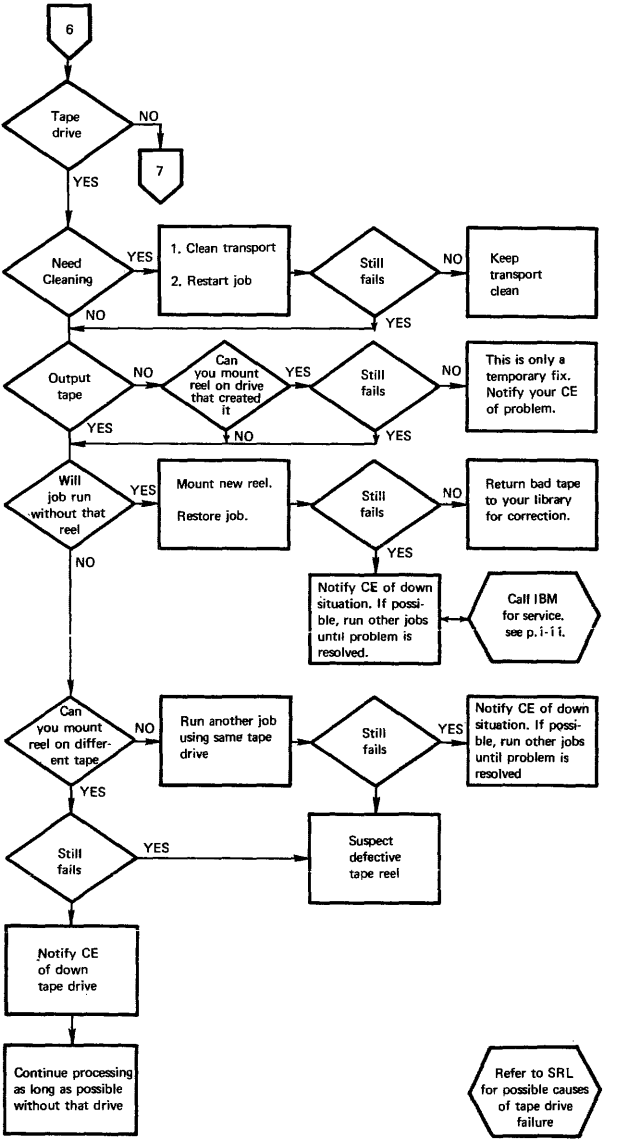
Problem Determination Chart S/370

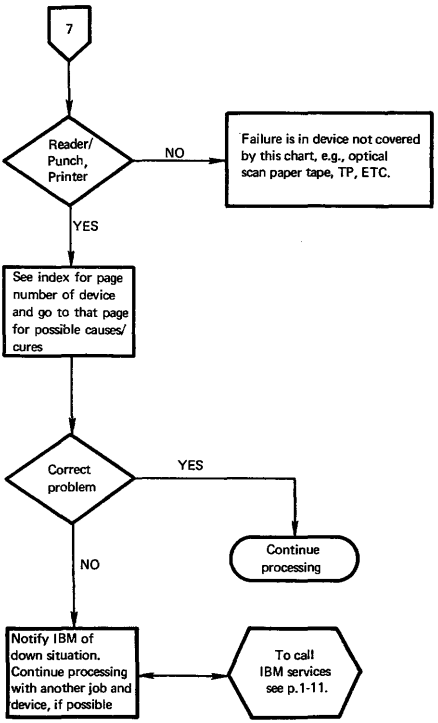


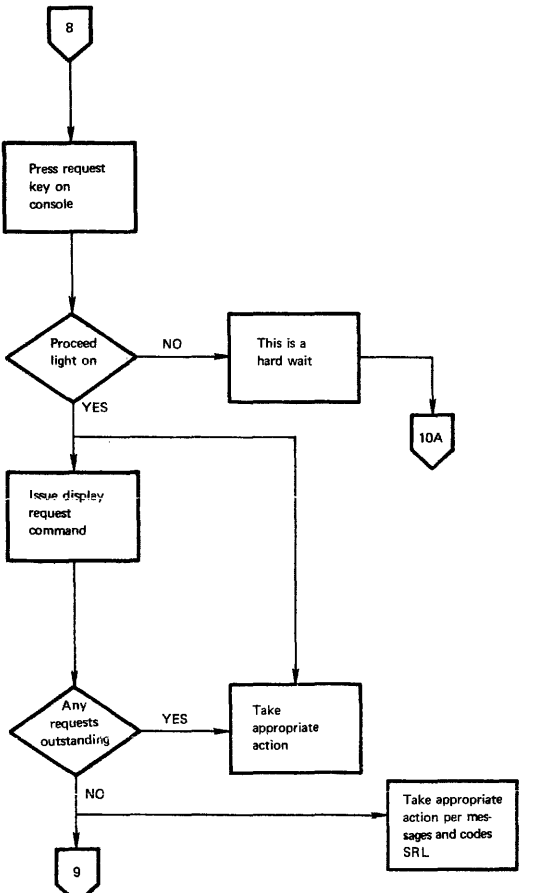

3
System indication
ON
TP running
YES
8
NO
System is either waiting for an I/O operation or is in a program loop.
OFF
4
Wait indication
System is waiting and I/O is stopped
Consult operating procedures for SCP in use
OP indication device error
NO
YES
See lead operator
5
OFF
Manual indication
OFF
Call CE
ON
Depress start button
Manual indication still on
YES
Call CE
NO
PROCEED

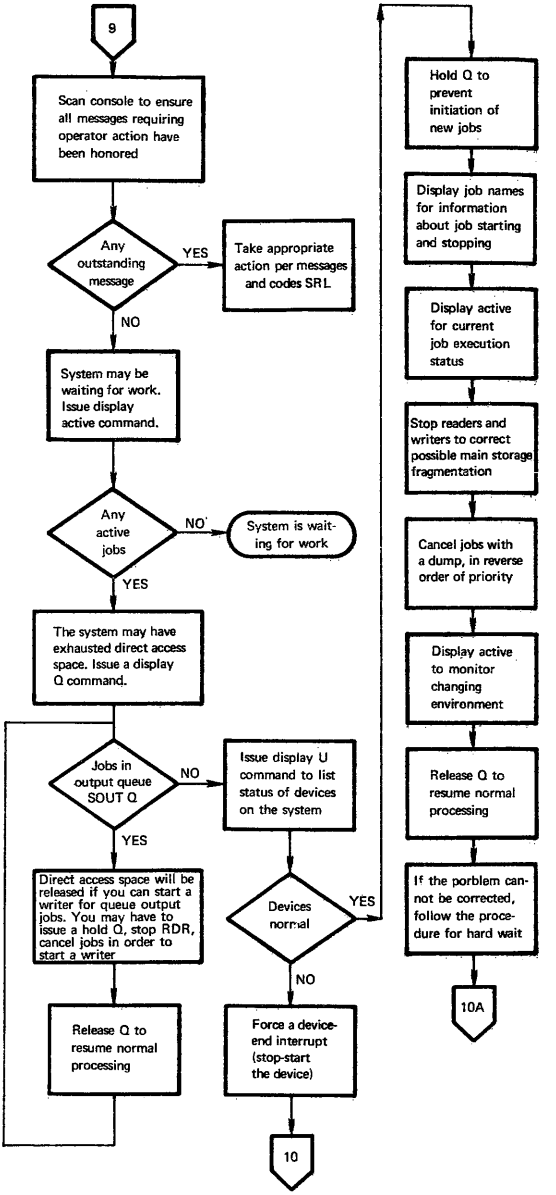

4
Turn off interval timer. Press stop button
System indication
YES
Channel may be hung (normal condition for TP). Record current PSW
NO
Manual indication
NO
Re-IPL, retry job. If error persists, call CE
Call IBM for services, see p.1-11
YES
System in a loop
Turn on interval timer. Press start button
Press request on console
Turn interval timer off. Press stop button
NO
Console proceed light on
Record loop and proceed
YES
Cancel the looping job with a dump
10A
1. Set rate switch to INSN step.
2. Display and record last 4 bytes of current PSW or instruction counter.
3. Press start and stop key.
4. Repeat until you have instruction stepped through the loop. If the loop is large, you may capture the small and large ends of the loop by placing the rate switch in process and pressing start and stop until observation of the PSW or instruction counter shows the desired range.
5. Set rate switch to process and press start.
Did cancel work
YES
Save dump for system programer or CE
NO
10A
Continue processing
Record PSW

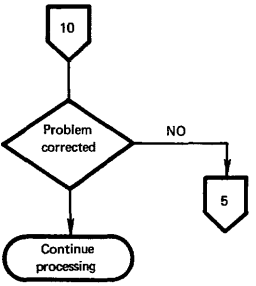

5
Direct access
NO
6
YES
Disk drive
NO
Check for failure of other devices: Reader/Punch, Printer. See re-start procedures, I/O Section.
OK now
YES
Continue processing
YES
NO
1. Mount pack on different drive.
2. Restart job.
See select lock check in SRL for disk drive
Will job run without device
NO
YES
Still fails
NO
1. Vary device offline.
2. Notify CE
YES
Do NOT move pack again
1. Vary device offline.
2. Notify CE
Backup pack or tape available.
NO
If possible, continue processing jobs that don't require device.
YES
Run program DASDI on failing pack.
Refer to independent utility programs IBCDASDI
DASDI fails
NO
Bad data or track. Restore pack from backup tape. Restart job.
YES
Possible defective device. Mark both pack and device down. Call CE
If possible, continue processing jobs that don't require device.

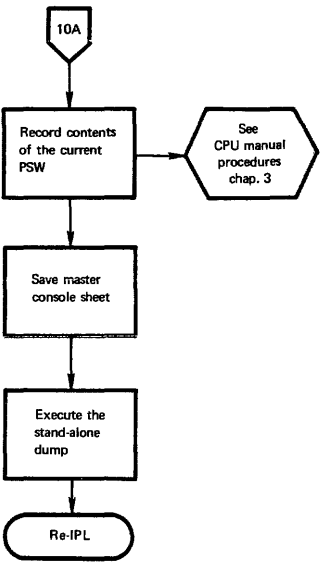

6
Tape drive
NO
7
YES
Need Cleaning
YES
1. Clean transport
2. Restart job
Still fails
NO
Keep transport clean
NO
YES
Output tape
NO
Can you mount reel on drive that created it
YES
Still fails
NO
This is only a temporary fix. Notify your CE of problem.
YES
NO
YES
Will job run without that reel
YES
Mount new reel.
Restore job.
Still fails
NO
Return bad tape to your library for correction.
YES
NO
Notify CE of down situation. If possible, run other jobs until problem is resolved.
Call IBM for service.
see p. i-ii.
Can you mount reel on different tape
NO
Run another job using same tape drive
Still fails
YES
Notify CE of down situation. If possible, run other jobs until problem is resolved
YES
Still fails
YES
Suspect defective tape reel
Notify CE of down tape drive
Continue processing as long as possible without that drive
Refer to SRL for possible causes of tape drive failure


7
Reader/ Punch, Printer
NO
Failure is in device not covered by this chart, e.g., optical scan paper tape, TP, ETC.
YES
See index for page number of device and go to that page for possible causes/ cures
Correct problem
YES
Continue processing
NO
Notify IBM of down situation. Continue processing with another job and device, if possible
To call IBM services see p.1-11.


8
Press request key on console
Proceed light on
NO
This is a hard wait
10A
YES
Issue display request command
Any requests outstanding
YES
Take appropriate action
NO
Take appropriate action per messages and codes SRL
9


9
Scan console to ensure all messages requiring operator action have been honored
Any outstanding message
YES
Take appropriate action per messages and codes SRL
NO
System may be waiting for work. Issue display active command.
Any active jobs
NO
System is waiting for work
YES
The system may have exhausted direct access space. Issue a display Q command.
Jobs in output queue SOUT Q
NO
Issue display U command to list status of devices on the system
YES
Direct access space will be released if you can start a writer for queue output jobs. You may have to issue a hold Q, stop RDR, cancel jobs in order to start a writer
Devices normal
YES
NO
Release Q to resume normal processing
Force a device-end interrupt (stop-start the device)
10
Hold Q to prevent initiation of new jobs
Display job names for information about job starting and stopping
Display active for current job execution status
Stop readers and writers to correct possible main storage fragmentation
Cancel jobs with a dump, in reverse order of priority
Display active to monitor changing environment
Release Q to resume normal processing
If the porblem cannot be corrected, follow the procedure for hard wait
10A


10
Problem corrected
NO
5
Continue processing


10A
Record contents of the current PSW
See CPU manual procedures chap. 3
Save master console sheet
Execute the stand-alone dump
Re-IPL

To Call IBM for Service

1. First check to see if there is a CE on site.

2. If not call your local IBM dispatch at:

   Normal IBM Branch Office hours _____.
   Outside of Normal Office hours _____.

3. Give dispatch the following information:

   1. Your company name, your name and extension.

   2. Type of machine (box) that gives the error indications.

   3. Type of system attached to (Mod 115, Mod 145, etc.)

   4. What is your urgency?

   5. If known, is your trouble hardware or software.

   6. Any special instructions a CE might need to know to get to your account.

   7. The CE that normally services your account.

      CE NAME—— _____.

Section 2 Contents

MACHINE INSTRUCTIONS

NAME	MNEMONIC	OP CODE	FORMAT	OPERANDS
Add (c)	AR	1A	RR	R1,R2
Add (c)	A	5A	RX	R1,D2(X2,B2)
Add Decimal (c)	AP	FA	SS	D1(L1,B1),D2(L2,B2)
Add Halfword (c)	AH	4A	RX	R1,D2(X2,B2)
Add Logical (c)	ALR	1E	RR	R1,R2
Add Logical (c)	AL	5E	RX	R1,D2(X2,B2)
AND (c)	NR	14	RR	R1,R2
AND (c)	N	54	RX	R1,D2(X2,B2)
AND (c)	NI	94	SI	D1(B1),I2
AND (c)	NC	D4	SS	D1(L,B1),D2(B2)
Branch and Link	BALR	05	RR	R1,R2
Branch and Link	BAL	45	RX	R1,D2(X2,B2)
Branch on Condition	BCR	07	RR	M1,R2
Branch on Condition	BC	47	RX	M1,D2(X2,B2)
Branch on Count	BCTR	06	RR	R1,R2
Branch on Count	BCT	46	RX	R1,D2(X2,B2)
Branch on Index High	BXH	86	RS	R1,R3,D2(B2)
Branch on Index Low or Equal	BXLE	87	RS	R1,R3,D2(B2)
Clear I/O (c,p)	CLRIO	9D01	S	D2(B2)
Compare (c)	CR	19	RR	R1,R2
Compare (c)	C	59	RX	R1,D2(X2,B2)
Compare and Swap (c)	CS	BA	RS	R1,R3,D2(B2)
Compare Decimal (c)	CP	F9	SS	D1(L1,B1),D2(L2,B2)
Compare Double and Swap (c)	CDS	BB	RS	R1,R3,D2(B2)
Compare Halfword (c)	CH	49	RX	R1,D2(X2,B2)
Compare Logical (c)	CLR	15	RR	R1,R2
Compare Logical (c)	CL	55	RX	R1,D2(X2,B2)
Compare Logical (c)	CLC	D5	SS	D1(L,B1),D2(B2)
Compare Logical (c)	CLI	95	SI	D1(B1),I2
Compare Logical Characters under Mask (c)	CLM	BD	RS	R1,M3,D2(B2)
Compare Logical Long (c)	CLCL	0F	RR	R1,R2
Convert to Binary	CVB	4F	RX	R1,D2(X2,B2)
Convert to Decimal	CVD	4E	RX	R1,D2(X2,B2)
Diagnose (p)		83		Model-dependent
Divide	DR	1D	RR	R1,R2
Divide	D	5D	RX	R1,D2(X2,B2)
Divide Decimal	DP	FD	SS	D1(L1,B1),D2(L2,B2)
Edit (c)	ED	DE	SS	D1(L,B1),D2(B2)
Edit and Mark (c)	EDMK	DF	SS	D1(L,B1),D2(B2)
Exclusive OR (c)	XR	17	RR	R1,R2
Exclusive OR (c)	X	57	RX	R1,D2(X2,B2)
Exclusive OR (c)	XI	97	SI	D1(B1),I2
Exclusive OR (c)	XC	D7	SS	D1(L,B1),D2(B2)
Execute	EX	44	RX	R1,D2(X2,B2)
Halt I/O (c,p)	HIO	9E00	S	D2(B2)
Halt Device (c,p)	HDV	9E01	S	D2(B2)
Insert Character	IC	43	RX	R1,D2(X2,B2)
Insert Characters under Mask (c)	ICM	BF	RS	R1,M3,D2(B2)
Insert PSW Key (p)	IPK	B20B	S	
Insert Storage Key (p)	ISK	09	RR	R1,R2
Load	LR	18	RR	R1,R2
Load	L	58	RX	R1,D2(X2,B2)
Load Address	LA	41	RX	R1,D2(X2,B2)
Load and Test (c)	LTR	12	RR	R1,R2
Load Complement (c)	LCR	13	RR	R1,R2
Load Control (p)	LCTL	B7	RS	R1,R3,D2(B2)
Load Halfword	LH	48	RX	R1,D2(X2,B2)
Load Multiple	LM	98	RS	R1,R3,D2(B2)
Load Negative (c)	LNR	11	RR	R1,R2
Load Positive (c)	LPR	10	RR	R1,R2
Load PSW (n,p)	LPSW	82	S	D2(B2)
Load Real Address (c,p)	LRA	B1	RX	R1,D2(X2,B2)
Monitor Call	MC	AF	SI	D1(B1),I2
Move	MVI	92	SI	D1(B1),I2
Move	MVC	D2	SS	D1(L,B1),D2(B2)
Move Long (c)	MVCL	0E	RR	R1,R2
Move Numerics	MVN	D1	SS	D1(L,B1),D2(B2)
Move with Offset	MVO	F1	SS	D1(L1,B1),D2(L2,B2)
Move Zones	MVZ	D3	SS	D1(L,B1),D2(B2)
Multiply	MR	1C	RR	R1,R2
Multiply	M	5C	RX	R1,D2(X2,B2)
Multiply Decimal	MP	FC	SS	D1(L1,B1),D2(L2,B2)
Multiply Halfword	MH	4C	RX	R1,D2(X2,B2)
OR (c)	OR	16	RR	R1,R2

MACHINE INSTRUCTIONS (Contd)

NAME	MNEMONIC	OP CODE	FOR MAT	OPERANDS
OR (c)	O	56	RX	R1,D2(X2,B2)
OR (c)	OI	96	SI	D1(B1),I2
OR (c)	OC	D6	SS	D1(L,B1),D2(B2)
Pack	PACK	F2	SS	D1(L1,B1),D2(L2,B2)
Purge TLB (p)	PTLB	B20D	S	
Read Direct (p)	RDD	85	SI	D1(B1),I2
Reset Reference Bit (c,p)	RRB	B213	S	D2(B2)
Set Clock (c,p)	SCK	B204	S	D2(B2)
Set Clock Comparator (p)	SCKC	B206	S	D2(B2)
Set CPU Timer (p)	SPT	B208	S	D2(B2)
Set Prefix (p)	SPX	B210	S	D2(B2)
Set Program Mask (n)	SPM	04	RR	R1
Set PSW Key from Address (p)	SPKA	B20A	S	D2(B2)
Set Storage Key (p)	SSK	08	RR	R1,R2
Set System Mask (p)	SSM	80	S	D2(B2)
Shift and Round Decimal (c)	SRP	F0	SS	D1(L1,B1),D2(B2),I3
Shift Left Double (c)	SLDA	8F	RS	R1,D2(B2)
Shift Left Double Logical	SLDL	8D	RS	R1,D2(B2)
Shift Left Single (c)	SLA	8B	RS	R1,D2(B2)
Shift Left Single Logical	SLL	89	RS	R1,D2(B2)
Shift Right Double (c)	SRDA	8E	RS	R1,D2(B2)
Shift Right Double Logical	SRDL	8C	RS	R1,D2(B2)
Shift Right Single (c)	SRA	8A	RS	R1,D2(B2)
Shift Right Single Logical	SRL	88	RS	R1,D2(B2)
Signal Processor (c,p)	SIGP	AE	RS	R1,R3,D2(B2)
Start I/O (c,p)	SIO	9C00	S	D2(B2)
Start I/O Fast Release (c,p)	SIOF	9C01	S	D2(B2)
Store	ST	50	RX	R1,D2(X2,B2)
Store Channel ID (c,p)	STIDC	B203	S	D2(B2)
Store Character	STC	42	RX	R1,D2(X2,B2)
Store Characters under Mask	STCM	BE	RS	R1,M3,D2(B2)
Store Clock (c)	STCK	B205	S	D2(B2)
Store Clock Comparator (p)	STCKC	B207	S	D2(B2)
Store Control (p)	STCTL	B6	RS	R1,R3,D2(B2)
Store CPU Address (p)	STAP	B212	S	D2(B2)
Store CPU ID (p)	STIDP	B202	S	D2(B2)
Store CPU Timer (p)	STPT	B209	S	D2(B2)
Store Halfword	STH	40	RX	R1,D2(X2,B2)
Store Multiple	STM	90	RS	R1,R3,D2(B2)
Store Prefix (p)	STPX	B211	S	D2(B2)
Store Then AND System Mask (p)	STNSM	AC	SI	D1(B1),I2
Store Then OR System Mask (p)	STOSM	AD	SI	D1(B1),I2
Subtract (c)	SR	1B	RR	R1,R2
Subtract (c)	S	5B	RX	R1,D2(X2,B2)
Subtract Decimal (c)	SP	FB	SS	D1(L1,B1),D2(L2,B2)
Subtract Halfword (c)	SH	4B	RX	R1,D2(X2,B2)
Subtract Logical (c)	SLR	1F	RR	R1,R2
Subtract Logical (c)	SL	5F	RX	R1,D2(X2,B2)
Supervisor Call	SVC	0A	RR	I
Test and Set (c)	TS	93	S	D2(B2)
Test Channel (c,p)	TCH	9F00	S	D2(B2)
Test I/O (c,p)	TIO	9D00	S	D2(B2)
Test under Mask (c)	TM	91	SI	D1(B1),I2
Translate	TR	DC	SS	D1(L,B1),D2(B2)
Translate and Test (c)	TRT	DD	SS	D1(L,B1),D2(B2)
Unpack	UNPK	F3	SS	D1(L1,B1),D2(L2,B2)
Write Direct (p)	WRD	84	SI	D1(B1),I2
Zero and Add Decimal (c)	ZAP	F8	SS	D1(L1,B1),D2(L2,B2)

Floating-Point Instructions

NAME	MNEMONIC	OP CODE	FOR-MAT	OPERANDS
Add Normalized, Extended (c,x)	AXR	36	RR	R1,R2
Add Normalized, Long (c)	ADR	2A	RR	R1,R2
Add Normalized, Long (c)	AD	6A	RX	R1,D2(X2,B2)
Add Normalized, Short (c)	AER	3A	RR	R1,R2
Add Normalized, Short (c)	AE	7A	RX	R1,D2(X2,B2)
Add Unnormalized, Long (c)	AWR	2E	RR	R1,R2
Add Unnormalized, Long (c)	AW	6E	RX	R1,D2(X2,B2)
Add Unnormalized, Short (c)	AUR	3E	RR	R1,R2
Add Unnormalized, Short (c)	AU	7E	RX	R1,D2(X2,B2)

c. Condition code is set.
n. New condition code is loaded.
p. Privileged instruction.
x. Extended precision floating-point.

Floating-Point Instructions (Contd)

NAME	MNEMONIC	OP CODE	FOR-MAT	OPERANDS
Compare, Long (c)	CDR	29	RR	R1,R2
Compare, Long (c)	CD	69	RX	R1,D2(X2,B2)
Compare, Short (c)	CER	39	RR	R1,R2
Compare, Short (c)	CE	79	RX	R1,D2(X2,B2)
Divide, Long	DDR	2D	RR	R1,R2
Divide, Long	DD	6D	RX	R1,D2(X2,B2)
Divide, Short	DER	3D	RR	R1,R2
Divide, Short	DE	7D	RX	R1,D2(X2,B2)
Halve, Long	HDR	24	RR	R1,R2
Halve, Short	HER	34	RR	R1,R2
Load and Test, Long (c)	LTDR	22	RR	R1,R2
Load and Test, Short (c)	LTER	32	RR	R1,R2
Load Complement, Long (c)	LCDR	23	RR	R1,R2
Load Complement, Short (c)	LCER	33	RR	R1,R2
Load, Long	LDR	28	RR	R1,R2
Load, Long	LD	68	RX	R1,D2(X2,B2)
Load Negative, Long (c)	LNDR	21	RR	R1,R2
Load Negative, Short (c)	LNER	31	RR	R1,R2
Load Positive, Long (c)	LPDR	20	RR	R1,R2
Load Positive, Short (c)	LPER	30	RR	R1,R2
Load Rounded, Extended to Long (x)	LRDR	25	RR	R1,R2
Load Rounded, Long to Short (x)	LRER	35	RR	R1,R2
Load, Short	LER	38	RR	R1,R2
Load, Short	LE	78	RX	R1,D2(X2,B2)
Multiply, Extended (x)	MXR	26	RR	R1,R2
Multiply, Long	MDR	2C	RR	R1,R2
Multiply, Long	MD	6C	RX	R1,D2(X2,B2)
Multiply, Long/Extended (x)	MXDR	27	RR	R1,R2
Multiply, Long/Extended (x)	MXD	67	RX	R1,D2(X2,B2)
Multiply, Short	MER	3C	RR	R1,R2
Multiply, Short	ME	7C	RX	R1,D2(X2,B2)
Store, Long	STD	60	RX	R1,D2(X2,B2)
Store, Short	STE	70	RX	R1,D2(X2,B2)
Subtract Normalized, Extended (c,x)	SXR	37	RR	R1,R2
Subtract Normalized, Long (c)	SDR	2B	RR	R1,R2
Subtract Normalized, Long (c)	SD	6B	RX	R1,D2(X2,B2)
Subtract Normalized, Short (c)	SER	3B	RR	R1,R2
Subtract Normalized, Short (c)	SE	7B	RX	R1,D2(X2,B2)
Subtract Unnormalized, Long (c)	SWR	2F	RR	R1,R2
Subtract Unnormalized, Long (c)	SW	6F	RX	R1,D2(X2,B2)
Subtract Unnormalized, Short (c)	SUR	3F	RR	R1,R2
Subtract Unnormalized, Short (c)	SU	7F	RX	R1,D2(X2,B2)

EXTENDED MNEMONIC INSTRUCTIONS†

Use	Extended Code* (RX or RR)	Meaning	Machine Instr.* (RX or RR)
General	B or BR	Unconditional Branch	BC or BCR 15,
	NOP or NOPR	No Operation	BC or BCR 0,
After Compare Instructions (A:B)	BH or *BHR*	Branch on A High	BC or BCR 2,
	BL or *BLR*	Branch on A Low	BC or BCR 4,
	BE or *BER*	Branch on A Equal B	BC or BCR 8,
	BNH or *BNHR*	Branch on A Not High	BC or BCR 13,
	BNL or *BNLR*	Branch on A Not Low	BC or BCR 11,
	BNE or *BNER*	Branch on A Not Equal B	BC or BCR 7,
After Arithmetic Instructions	BO or *BOR*	Branch on Overflow	BC or BCR 1,
	BP or *BPR*	Branch on Plus	BC or BCR 2,
	BM or *BMR*	Branch on Minus	BC or BCR 4,
	BNP or *BNPR*	Branch on Not Plus	BC or BCR 13,
	BNM or *BNMR*	Branch on Not Minus	BC or BCR 11,
	BNZ or *BNZR*	Branch on Not Zero	BC or BCR 7,
	BZ or *BZR*	Branch on Zero	BC or BCR 8,
After Test under Mask Instruction	BO or *BOR*	Branch if Ones	BC or BCR 1,
	BM or *BMR*	Branch if Mixed	BC or BCR 4,
	BZ or *BZR*	Branch if Zeros	BC or BCR 8,
	BNO or *BNOR*	Branch if Not Ones	BC or BCR 14,

*Second operand not shown; in all cases it is D2(X2,B2) for RX format or R2 for RR format.

†For OS/VS and DOS/VS; source: GC33-4010.

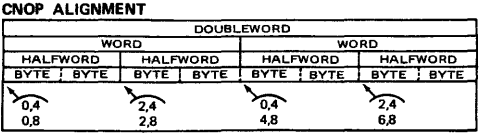
EDIT AND EDMK PATTERN CHARACTERS (in hex)

20—digit selector	40—blank	5C—asterisk
21—start of significance	4B—period	6B—comma
22—field separator	5B—dollar sign	C3D9—CR

CONDITION CODES

Condition Code Setting	0	1	2	3
Mask Bit Value	**8**	**4**	**2**	**1**
General Instructions				
Add, Add Halfword	zero	<zero	>zero	overflow
Add Logical	zero; no carry	not zero, no carry	zero, carry	not zero, carry
AND	zero	not zero	–	–
Compare, Compare Halfword	equal	1st op low	1st op high	–
Compare and Swap/Double	equal	not equal	–	–
Compare Logical	equal	1st op low	1st op high	–
Exclusive OR	zero	not zero	–	–
Insert Characters under Mask	all zero	1st bit one	1st bit zero	–
Load and Test	zero	<zero	>zero	–
Load Complement	zero	<zero	>zero	overflow
Load Negative	zero	<zero	–	–
Load Positive	zero	–	>zero	overflow
Move Long	count equal	count low	count high	overlap
OR	zero	not zero	–	–
Shift Left Double/Single	zero	<zero	>zero	overflow
Shift Right Double/Single	zero	<zero	>zero	–
Store Clock	set	not set	error	not oper
Subtract, Subtract Halfword	zero	<zero	>zero	overflow
Subtract Logical	–	not zero, no carry	zero, carry	not zero, carry
Test and Set	zero	one	–	–
Test under Mask	zero	mixed	–	ones
Translate and Test	zero	incomplete	complete	–
Decimal Instructions				
Add Decimal	zero	<zero	>zero	overflow
Compare Decimal	equal	1st op low	1st op high	–
Edit, Edit and Mark	zero	<zero	>zero	–
Shift and Round Decimal	zero	<zero	>zero	overflow
Subtract Decimal	zero	<zero	>zero	overflow
Zero and Add	zero	<zero	>zero	overflow
Floating-Point Instructions				
Add Normalized	zero	<zero	>zero	–
Add Unnormalized	zero	<zero	>zero	–
Compare	equal	1st op low	1st op high	–
Load and Test	zero	<zero	>zero	–
Load Complement	zero	<zero	>zero	–
Load Negative	zero	<zero	–	–
Load Positive	zero	–	>zero	–
Subtract Normalized	zero	<zero	>zero	–
Subtract Unnormalized	zero	<zero	>zero	–
Input/Output Instructions				
Clear I/O	no oper in progress	CSW stored	chan busy	not oper
Halt Device	interruption pending	CSW stored	channel working	not oper
Halt I/O	interruption pending	CSW stored	burst op stopped	not oper
Start I/O, SIOF	successful	CSW stored	busy	not oper
Store Channel ID	ID stored	CSW stored	busy	not oper
Test Channel	available	interruption pending	burst mode	not oper
Test I/O	available	CSW stored	busy	not oper
System Control Instructions				
Load Real Address	translation available	ST entry invalid	PT entry invalid	length violation
Reset Reference Bit	R=0, C=0	R=0, C=1	R=1, C=0	R=1, C=1
Set Clock	set	secure	–	not oper
Signal Processor	accepted	stat stored	busy	not oper

CNOP ALIGNMENT



ASSEMBLER INSTRUCTIONS†

Function	Mnemonic	Meaning
Data definition	DC	Define constant
	DS	Define storage
	CCW	Define channel command word
Program sectioning and linking	START	Start assembly
	CSECT	Identify control section
	DSECT	Identify dummy section
	DXD*	Define external dummy section
	CXD*	Cumulative length of external dummy section
	COM	Identify blank common control section
	ENTRY	Identify entry-point symbol
	EXTRN	Identify external symbol
	WXTRN	Identify weak external symbol
Base register assignment	USING	Use base address register
	DROP	Drop base address register
Control of listings	TITLE	Identify assembly output
	EJECT	Start new page
	SPACE	Space listing
	PRINT	Print optional data
Program Control	ICTL	Input format control
	ISEQ	Input sequence checking
	PUNCH	Punch a card
	REPRO	Reproduce following card
	ORG	Set location counter
	EQU	Equate symbol
	OPSYN*	Equate operation code
	*PUSH**	Save current PRINT or USING status
	*POP**	Restore PRINT or USING status
	LTORG	Begin literal pool
	CNOP	Conditional no operation
	COPY	Copy predefined source coding
	END	End assembly
Macro definition	MACRO	Macro definition header
	MNOTE	Request for error message
	MEXIT	Macro definition exit
	MEND	Macro definition trailer
Conditional assembly	ACTR	Conditional assembly loop counter
	AGO	Unconditional branch
	AIF	Conditional branch
	ANOP	Assembly no operation
	GBLA	Define global SETA symbol
	GBLB	Define global SETB symbol
	GBLC	Define global SETC symbol
	LCLA	Define local SETA symbol
	LCLB	Define local SETB symbol
	LCLC	Define local SETC symbol
	SETA	Set arithmetic variable symbol
	SETB	Set binary variable symbol
	SETC	Set character variable symbol

SUMMARY OF CONSTANTS†

TYPE	IMPLIED LENGTH, BYTES	ALIGNMENT	FORMAT	TRUNCATION/ PADDING
C	–	byte	characters	right
X	–	byte	hexadecimal digits	left
B	–	byte	binary digits	left
F	4	word	fixed-point binary	left
H	2	halfword	fixed-point binary	left
E	4	word	short floating-point	right
D	8	doubleword	long floating-point	right
L	16	doubleword	extended floating-point	right
P	–	byte	packed decimal	left
Z	–	byte	zoned decimal	left
A	4	word	value of address	left
Y	2	halfword	value of address	left
S	2	halfword	address in base-displacement form	–
V	4	word	externally defined address value	left
Q*	4	word	symbol naming a DXD or DSECT	left

†For OS/VS and DOS/VS; source: GC33-4010.
*OS/VS only.

I/O COMMAND CODES

Standard Command Code Assignments (CCW bits 0-7)

xxxx 0000	Invalid	†††† ††01	Write
†††† 0100	Sense	†††† ††10	Read
xxxx 1000	Transfer in Channel	†††† ††11	Control
†††† 1100	Read Backward	0000 0011	Control No Operation

x—Bit ignored. †Modifier bit for specific type of I/O device

CONSOLE PRINTERS

Write, No Carrier Return	01	Sense	04
Write, Auto Carrier Return	09	Audible Alarm	0B
Read Inquiry	0A		

3504, 3505 CARD READERS/3525 CARD PUNCH

Source: GA21-9124

Command	Binary	Hex
Sense	0000 0100	04
Feed, Select Stacker	SS10 F011	
Read Only*	11D0 F010	
Diagnostic Read	1101 0010	D2
Read, Feed, Select Stacker*	SSD0 F010	
Write RCE Format*	0001 0001	11
3504, 3505 only		
Write OMR Format†	0011 0001	31
3525 only		
Write, Feed, Select Stacker	SSD0 0001	
Print Line*	LLLL L101	

Bit Meanings

SS Stacker: 00 1; 01/10 2

F Format Mode: 0 Unformatted; 1 Formatted

D Data Mode: 0 1—EBCDIC; 1 2—Card image

L Line Position: 5-bit binary value

*Special feature on 3525. †Special feature.

PRINTERS: 3211/3811 (GA24-3543), 3203/IPA, 1403*/2821 (GA24-3312)

	After Write	Immed
Space 1 Line	09	0B
Space 2 Lines	11	13
Space 3 Lines	19	1B
Skip to Channel 0†	–	83
Skip to Channel 1	89	8B
Skip to Channel 2	91	93
Skip to Channel 3	99	9B
Skip to Channel 4	A1	A3
Skip to Channel 5	A9	AB
Skip to Channel 6	B1	B3
Skip to Channel 7	B9	BB
Skip to Channel 8	C1	C3
Skip to Channel 9	C9	CB
Skip to Channel 10	D1	D3
Skip to Channel 11	D9	DB
Skip to Channel 12	E1	E3

Write without spacing	01
Sense	04
Load UCSB without folding	FB
Fold†	43
Unfold†	23
Load UCSB and Fold (exc. 3211)	F3
UCS Gate Load (1403 only)	E8
Load FCB†	63
Block Data Check	73
Allow Data Check	7B
Read PLB†	02
Read UCSB†	0A
Read FCB†	12
Diag. Check Read (exc. 3203)	06
Diagnostic Write†	05
Raise Cover†	6B
Diagnostic Gate†	07
Diagnostic Read (1403 only)	02

*UCS special feature; IPA diagnostics are model-dependent. †3211 only.

3420/3803, 3410/3411 MAGNETIC TAPE

(**Indicates 3420 only)

See GA32-0020, -0021, -0022 for special features and functions of specific models.

Write	01
Read Forward	02
Read Backward	0C
Sense	04
Sense Reserve**	F4
Sense Release**	D4
Request Track-in-Error	1B
Loop Write-to-Read**	8B
Set Diagnose**	4B
Rewind	07
Rewind Unload	0F
Erase Gap	17
Write Tape Mark	1F
Backspace Block	27
Backspace File	2F
Forward Space Block	37
Forward Space File	3F
Data Security Erase**	97
Diagnostic Mode Set**	0B

Mode Set 1 (7-track)

Density	Parity	DC	Trans	Cmd
200	odd	on	off	13
		off	off	33
			on	3B
	even	off	off	23
			on	2B
556	odd	on	off	53
		off	off	73
			on	7B
	even	off	off	63
			on	6B
800	odd	on	off	93
		off	off	B3
			on	BB
	even	off	off	A3
			on	AB

Mode Set 2 (9-track), 800 bpi	CB
Mode Set 2 (9-track), 1600 bpi	C3
Mode Set 2 (9-track), 6250 bpi**	D3

I/O COMMAND CODES (Contd)

DIRECT ACCESS STORAGE DEVICES:

3330-3340 SERIES (GA26-1592, -1617, -1619, -1620);
2305/2835 (GA26-1589); **2314, 2319** (GA26-3599, -1606)

Command		MT Off	MT On*	Count
Control	Orient (c)	2B		Nonzero
	Recalibrate	13		Nonzero
	Seek	07		6
	Seek Cylinder	0B		6
	Seek Head	1B		6
	Space Count	0F		3 (a); nonzero (d)
	Set File Mask	1F		1
	Set Sector (a,f)	23		1
	Restore (executes as a no-op)	17		Nonzero
	Vary Sensing (c)	27		1
	Diagnostic Load (a)	53		1
	Diagnostic Write (a)	73		512
Search	Home Address Equal	39	B9	4
	Identifier Equal	31	B1	5
	Identifier High	51	D1	5
	Identifier Equal or High	71	F1	5
	Key Equal	29	A9	KL
	Key High	49	C9	KL
	Key Equal or High	69	E9	KL
	Key and Data Equal (d)	2D	AD	Number of bytes (including mask bytes) in search argument
	Key and Data High (d)	4D	CD	
	Key and Data Eq. or Hi (d)	6D	ED	
Continue Scan	Search Equal (d)	25	A5	
	Search High (d)	45	C5	
	Search High or Equal (d)	65	E5	
	Set Compare (d)	35	B5	
	Set Compare (d)	75	F5	
	No Compare (d)	55	D5	
Read	Home Address	1A	9A	5
	Count	12	92	8
	Record 0	16	96	Number of bytes to be transferred
	Data	06	86	
	Key and Data	0E	8E	
	Count, Key and Data	1E	9E	
	IPL	02		
	Sector (a,f)	22		1
Sense	Sense I/O	04		24 (a); 6 (d)
	Read, Reset Buffered Log (b)	A4		24
	Read Buffered Log (c)	24		128
	Device Release (e)	94		24 (a); 6 (d)
	Device Reserve (e)	B4		24 (a); 6 (d)
	Read Diagnostic Status 1 (a)	44		16 or 512
Write	Home Address	19		5 (exc. 7 on 3340)
	Record 0	15		8+KL+DL of R0
	Erase	11		8+KL+DL
	Count, Key and Data	1D		8+KL+DL
	Special Count, Key and Data	01		8+KL+DL
	Data	05		DL
	Key and Data	0D		KL+DL

* Code same as MT Off except as listed.
a. Except 2314, 2319.
b. 3330-3340 Series only; manual reset on 3340.
c. 2305/2835 only.
d. 2314, 2319 only.
e. String switch or 2-channel switch feature required; standard on 2314 with 2844.
f. Special feature required on 3340.

CODE TRANSLATION TABLE

Dec.	Hex	Instruction (RR)	Graphics and Controls BCDIC	EBCDIC(1)	ASCII	7-Track Tape BCDIC(2)	EBCDIC Card Code	Binary
0	00			NUL	NUL		12-0-1-8-9	0000 0000
1	01			SOH	SOH		12-1-9	0000 0001
2	02			STX	STX		12-2-9	0000 0010
3	03			ETX	ETX		12-3-9	0000 0011
4	04	SPM		PF	EOT		12-4-9	0000 0100
5	05	BALR		HT	ENQ		12-5-9	0000 0101
6	06	BCTR		LC	ACK		12-6-9	0000 0110
7	07	BCR		DEL	BEL		12-7-9	0000 0111
8	08	SSK			BS		12-8-9	0000 1000
9	09	ISK			HT		12-1-8-9	0000 1001
10	0A	SVC		SMM	LF		12-2-8-9	0000 1010
11	0B			VT	VT		12-3-8-9	0000 1011
12	0C			FF	FF		12-4-8-9	0000 1100
13	0D			CR	CR		12-5-8-9	0000 1101
14	0E	MVCL		SO	SO		12-6-8-9	0000 1110
15	0F	CLCL		SI	SI		12-7-8-9	0000 1111
16	10	LPR		DLE	DLE		12-11-1-8-9	0001 0000
17	11	LNR		DC1	DC1		11-1-9	0001 0001
18	12	LTR		DC2	DC2		11-2-9	0001 0010
19	13	LCR		TM	DC3		11-3-9	0001 0011
20	14	NR		RES	DC4		11-4-9	0001 0100
21	15	CLR		NL	NAK		11-5-9	0001 0101
22	16	OR		BS	SYN		11-6-9	0001 0110
23	17	XR		IL	ETB		11-7-9	0001 0111
24	18	LR		CAN	CAN		11-8-9	0001 1000
25	19	CR		EM	EM		11-1-8-9	0001 1001
26	1A	AR		CC	SUB		11-2-8-9	0001 1010
27	1B	SR		CU1	ESC		11-3-8-9	0001 1011
28	1C	MR		IFS	FS		11-4-8-9	0001 1100
29	1D	DR		IGS	GS		11-5-8-9	0001 1101
30	1E	ALR		IRS	RS		11-6-8-9	0001 1110
31	1F	SLR		IUS	US		11-7-8-9	0001 1111
32	20	LPDR		DS	SP		11-0-1-8-9	0010 0000
33	21	LNDR		SOS	!		0-1-9	0010 0001
34	22	LTDR		FS	"		0-2-9	0010 0010
35	23	LCDR			#		0-3-9	0010 0011
36	24	HDR		BYP	$		0-4-9	0010 0100
37	25	LRDR		LF	%		0-5-9	0010 0101
38	26	MXR		ETB	&		0-6-9	0010 0110
39	27	MXDR		ESC	'		0-7-9	0010 0111
40	28	LDR			(		0-8-9	0010 1000
41	29	CDR			)		0-1-8-9	0010 1001
42	2A	ADR		SM	*		0-2-8-9	0010 1010
43	2B	SDR		CU2	+		0-3-8-9	0010 1011
44	2C	MDR			,		0-4-8-9	0010 1100
45	2D	DDR		ENQ	-		0-5-8-9	0010 1101
46	2E	AWR		ACK	.		0-6-8-9	0010 1110
47	2F	SWR		BEL	/		0-7-8-9	0010 1111
48	30	LPER			0		12-11-0-1-8-9	0011 0000
49	31	LNER			1		1-9	0011 0001
50	32	LTER		SYN	2		2-9	0011 0010
51	33	LCER			3		3-9	0011 0011
52	34	HER		PN	4		4-9	0011 0100
53	35	LRER		RS	5		5-9	0011 0101
54	36	AXR		UC	6		6-9	0011 0110
55	37	SXR		EOT	7		7-9	0011 0111
56	38	LER			8		8-9	0011 1000
57	39	CER			9		1-8-9	0011 1001
58	3A	AER			:		2-8-9	0011 1010
59	3B	SER		CU3	;		3-8-9	0011 1011
60	3C	MER		DC4	<		4-8-9	0011 1100
61	3D	DER		NAK	=		5-8-9	0011 1101
62	3E	AUR			>		6-8-9	0011 1110
63	3F	SUR		SUB	?		7-8-9	0011 1111

1. Two columns of EBCDIC graphics are shown. The first gives standard bit pattern assignments. The second shows the T-11 and TN text printing chains (120 graphics).
2. Add C (check bit) for odd or even parity as needed, except as noted.
3. For even parity use CA.

TWO-CHARACTER BSC DATA LINK CONTROLS

Function	EBCDIC	ASCII
ACK-0	DLE,X'70'	DLE,0
ACK-1	DLE,X'61'	DLE,1
WACK	DLE,X'6B'	DLE,;
RVI	DLE,X'7C'	DLE,<

CODE TRANSLATION TABLE (Contd)

Dec.	Hex	Instruction (RX)	Graphics and Controls BCDIC	EBCDIC(1)	ASCII	7-Track Tape BCDIC(2)	EBCDIC Card Code	Binary
64	40	STH	Sp	Sp	@	(3)	no punches	0100 0000
65	41	LA			A		12-0-1-9	0100 0001
66	42	STC			B		12-0-2-9	0100 0010
67	43	IC			C		12-0-3-9	0100 0011
68	44	EX			D		12-0-4-9	0100 0100
69	45	BAL			E		12-0-5-9	0100 0101
70	46	BCT			F		12-0-6-9	0100 0110
71	47	BC			G		12-0-7-9	0100 0111
72	48	LH			H		12-0-8-9	0100 1000
73	49	CH			I		12-1-8	0100 1001
74	4A	AH	¢	¢	J		12-2-8	0100 1010
75	4B	SH	.	.	K	B A 8 2 1	12-3-8	0100 1011
76	4C	MH	¤)	<	L	B A 8 4	12-4-8	0100 1100
77	4D		[	(	M	B A 8 4 1	12-5-8	0100 1101
78	4E	CVD	<	+	N	B A 8 4 2	12-6-8	0100 1110
79	4F	CVB	‡	!	O	B A 8 4 2 1	12-7-8	0100 1111
80	50	ST	& +	&	P	B A	12	0101 0000
81	51				Q		12-11-1-9	0101 0001
82	52				R		12-11-2-9	0101 0010
83	53				S		12-11-3-9	0101 0011
84	54	N			T		12-11-4-9	0101 0100
85	55	CL			U		12-11-5-9	0101 0101
86	56	O			V		12-11-6-9	0101 0110
87	57	X			W		12-11-7-9	0101 0111
88	58	L			X		12-11-8-9	0101 1000
89	59	C			Y		11-1-8	0101 1001
90	5A	A	!	!	Z		11-2-8	0101 1010
91	5B	S	$	$	$	[B 8 2 1	11-3-8	0101 1011
92	5C	M	*	*	*	\ B 8 4	11-4-8	0101 1100
93	5D	D	]	)	)	] B 8 4 1	11-5-8	0101 1101
94	5E	AL	;	;	;	¬ ^ B 8 4 2	11-6-8	0101 1110
95	5F	SL	Δ	¬	¬	_ B 8 4 2 1	11-7-8	0101 1111
96	60	STD	-	-	-	` B	11	0110 0000
97	61		/	/	/	a A 1	0-1	0110 0001
98	62					b	11-0-2-9	0110 0010
99	63					c	11-0-3-9	0110 0011
100	64					d	11-0-4-9	0110 0100
101	65					e	11-0-5-9	0110 0101
102	66					f	11-0-6-9	0110 0110
103	67	MXD				g	11-0-7-9	0110 0111
104	68	LD				h	11-0-8-9	0110 1000
105	69	CD				i	0-1-8	0110 1001
106	6A	AD		!		j	12-11	0110 1010
107	6B	SD	,	,	,	k A 8 2 1	0-3-8	0110 1011
108	6C	MD	% (	%	%	l A 8 4	0-4-8	0110 1100
109	6D	DD	Y	_	_	m A 8 4 1	0-5-8	0110 1101
110	6E	AW	\	>	>	n A 8 4 2	0-6-8	0110 1110
111	6F	SW	**	?	?	o A 8 4 2 1	0-7-8	0110 1111
112	70	STE				p	12-11-0	0111 0000
113	71					q	12-11-0-1-9	0111 0001
114	72					r	12-11-0-2-9	0111 0010
115	73					s	12-11-0-3-9	0111 0011
116	74					t	12-11-0-4-9	0111 0100
117	75					u	12-11-0-5-9	0111 0101
118	76					v	12-11-0-6-9	0111 0110
119	77					w	12-11-0-7-9	0111 0111
120	78	LE				x	12-11-0-8-9	0111 1000
121	79	CE		`		y	1-8	0111 1001
122	7A	AE	¢	:	:	z A	2-8	0111 1010
123	7B	SE	# =	#	#	{ 8 2 1	3-8	0111 1011
124	7C	ME	@ '	@	@	| 8 4	4-8	0111 1100
125	7D	DE	:	'	'	} 8 4 1	5-8	0111 1101
126	7E	AU	>	"	"	~ 8 4 2	6-8	0111 1110
127	7F	SU	✓	"	"	DEL 8 4 2 1	7-8	0111 1111

CODE TRANSLATION TABLE (Contd)

Dec.	Hex	Instruction and Format	Graphics and Controls BCDIC	EBCDIC(1)	ASCII	7-Track Tape BCDIC(2)	EBCDIC Card Code	Binary
128	80	SSM -S					12-0-1-8	1000 0000
129	81			a	a		12-0-1	1000 0001
130	82	LPSW -S		b	b		12-0-2	1000 0010
131	83	Diagnose		c	c		12-0-3	1000 0011
132	84	WRD SI		d	d		12-0-4	1000 0100
133	85	RDD		e	e		12-0-5	1000 0101
134	86	BXH		f	f		12-0-6	1000 0110
135	87	BXLE		g	g		12-0-7	1000 0111
136	88	SRL		h	h		12-0-8	1000 1000
137	89	SLL		i	i		12-0-9	1000 1001
138	8A	SRA					12-0-2-8	1000 1010
139	8B	SLA RS			{		12-0-3-8	1000 1011
140	8C	SRDL			≤		12-0-4-8	1000 1100
141	8D	SLDL			(		12-0-5-8	1000 1101
142	8E	SRDA			+		12-0-6-8	1000 1110
143	8F	SLDA			±		12-0-7-8	1000 1111
144	90	STM					12-11-1-8	1001 0000
145	91	TM		j	j		12-11-1	1001 0001
146	92	MVI SI		k	k		12-11-2	1001 0010
147	93	TS -S		l	l		12-11-3	1001 0011
148	94	NI		m	m		12-11-4	1001 0100
149	95	CLI		n	n		12-11-5	1001 0101
150	96	OI SI		o	o		12-11-6	1001 0110
151	97	XI		p	p		12-11-7	1001 0111
152	98	LM -RS		q	q		12-11-8	1001 1000
153	99			r	r		12-11-9	1001 1001
154	9A						12-11-2-8	1001 1010
155	9B				}		12-11-3-8	1001 1011
156	9C	SIO, SIOF			⊟		12-11-4-8	1001 1100
157	9D	TIO, CLRIO S			)		12-11-5-8	1001 1101
158	9E	HIO, HDV			±		12-11-6-8	1001 1110
159	9F	TCH			■		12-11-7-8	1001 1111
160	A0				~		11-0-1-8	1010 0000
161	A1			~	◦		11-0-1	1010 0001
162	A2			s	s		11-0-2	1010 0010
163	A3			t	t		11-0-3	1010 0011
164	A4			u	u		11-0-4	1010 0100
165	A5			v	v		11-0-5	1010 0101
166	A6			w	w		11-0-6	1010 0110
167	A7			x	x		11-0-7	1010 0111
168	A8			y	y		11-0-8	1010 1000
169	A9			z	z		11-0-9	1010 1001
170	AA						11-0-2-8	1010 1010
171	AB				L		11-0-3-8	1010 1011
172	AC	STNSM SI			⌐		11-0-4-8	1010 1100
173	AD	STOSM			[		11-0-5-8	1010 1101
174	AE	SIGP -RS			≥		11-0-6-8	1010 1110
175	AF	MC -SI			●		11-0-7-8	1010 1111
176	B0				0		12-11-0-1-8	1011 0000
177	B1	LRA -RX			1		12-11-0-1	1011 0001
178	B2	See below			2		12-11-0-2	1011 0010
179	B3				3		12-11-0-3	1011 0011
180	B4				4		12-11-0-4	1011 0100
181	B5				5		12-11-0-5	1011 0101
182	B6	STCTL RS			6		12-11-0-6	1011 0110
183	B7	LCTL			7		12-11-0-7	1011 0111
184	B8				8		12-11-0-8	1011 1000
185	B9				9		12-11-0-9	1011 1001
186	BA	CS RS					12-11-0-2-8	1011 1010
187	BB	CDS			⌟		12-11-0-3-8	1011 1011
188	BC				¬		12-11-0-4-8	1011 1100
189	BD	CLM			]		12-11-0-5-8	1011 1101
190	BE	STCM RS			≠		12-11-0-6-8	1011 1110
191	BF	ICM			—		12-11-0-7-8	1011 1111

Op code (S format)

B202 - STIDP	B207 - STCKC	B20D - PTLB
B203 - STIDC	B208 - SPT	B210 - SPX
B204 - SCK	B209 - STPT	B211 - STPX
B205 - STCK	B20A - SPKA	B212 - STAP
B206 - SCKC	B20B - IPK	B213 - RRB

CODE TRANSLATION TABLE (Contd)

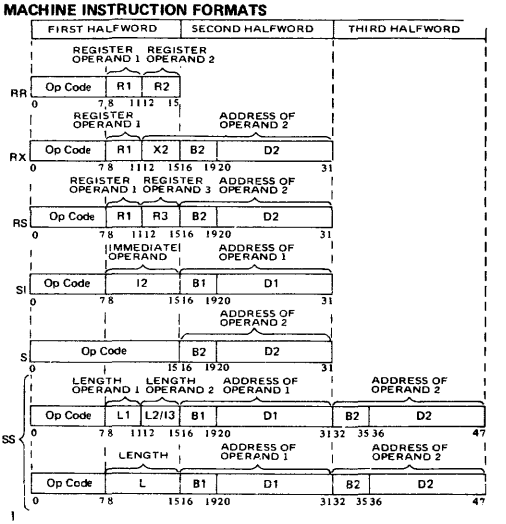
Dec.	Hex	Instruction (SS)	Graphics and Controls BCDIC	EBCDIC(1)	ASCII	7-Track Tape BCDIC(2)	EBCDIC Card Code	Binary
192	C0		?	{		B A 8 2	12-0	1100 0000
193	C1		A	A	A	B A 1	12-1	1100 0001
194	C2		B	B	B	B A 2	12-2	1100 0010
195	C3		C	C	C	B A 2 1	12-3	1100 0011
196	C4		D	D	D	B A 4	12-4	1100 0100
197	C5		E	E	E	B A 4 1	12-5	1100 0101
198	C6		F	F	F	B A 4 2	12-6	1100 0110
199	C7		G	G	G	B A 4 2 1	12-7	1100 0111
200	C8		H	H	H	B A 8	12-8	1100 1000
201	C9		I	I	I	B A 8 1	12-9	1100 1001
202	CA						12-0-2-8-9	1100 1010
203	CB						12-0-3-8-9	1100 1011
204	CC			⌠			12-0-4-8-9	1100 1100
205	CD						12-0-5-8-9	1100 1101
206	CE			Ψ			12-0-6-8-9	1100 1110
207	CF						12-0-7-8-9	1100 1111
208	D0		!	}		B 8 2	11-0	1101 0000
209	D1	MVN	J	J	J	B 1	11-1	1101 0001
210	D2	MVC	K	K	K	B 2	11-2	1101 0010
211	D3	MVZ	L	L	L	B 2 1	11-3	1101 0011
212	D4	NC	M	M	M	B 4	11-4	1101 0100
213	D5	CLC	N	N	N	B 4 1	11-5	1101 0101
214	D6	OC	O	O	O	B 4 2	11-6	1101 0110
215	D7	XC	P	P	P	B 4 2 1	11-7	1101 0111
216	D8		Q	Q	Q	B 8	11-8	1101 1000
217	D9		R	R	R	B 8 1	11-9	1101 1001
218	DA						12-11-2-8-9	1101 1010
219	DB						12-11-3-8-9	1101 1011
220	DC	TR					12-11-4-8-9	1101 1100
221	DD	TRT					12-11-5-8-9	1101 1101
222	DE	ED					12-11-6-8-9	1101 1110
223	DF	EDMK					12-11-7-8-9	1101 1111
224	E0		≠	\		A 8 2	0-2-8	1110 0000
225	E1						11-0-1-9	1110 0001
226	E2		S	S	S	A 2	0-2	1110 0010
227	E3		T	T	T	A 2 1	0-3	1110 0011
228	E4		U	U	U	A 4	0-4	1110 0100
229	E5		V	V	V	A 4 1	0-5	1110 0101
230	E6		W	W	W	A 4 2	0-6	1110 0110
231	E7		X	X	X	A 4 2 1	0-7	1110 0111
232	E8		Y	Y	Y	A 8	0-8	1110 1000
233	E9		Z	Z	Z	A 8 1	0-9	1110 1001
234	EA						11-0-2-8-9	1110 1010
235	EB						11-0-3-8-9	1110 1011
236	EC			⌡			11-0-4-8-9	1110 1100
237	ED						11-0-5-8-9	1110 1101
238	EE						11-0-6-8-9	1110 1110
239	EF						11-0-7-8-9	1110 1111
240	F0	SRP	0	0	0	8 2	0	1111 0000
241	F1	MVO	1	1	1	1	1	1111 0001
242	F2	PACK	2	2	2	2	2	1111 0010
243	F3	UNPK	3	3	3	2 1	3	1111 0011
244	F4		4	4	4	4	4	1111 0100
245	F5		5	5	5	4 1	5	1111 0101
246	F6		6	6	6	4 2	6	1111 0110
247	F7		7	7	7	4 2 1	7	1111 0111
248	F8	ZAP	8	8	8	8	8	1111 1000
249	F9	CP	9	9	9	8 1	9	1111 1001
250	FA	AP		|			12-11-0-2-8-9	1111 1010
251	FB	SP					12-11-0-3-8-9	1111 1011
252	FC	MP					12-11-0-4-8-9	1111 1100
253	FD	DP					12-11-0-5-8-9	1111 1101
254	FE						12-11-0-6-8-9	1111 1110
255	FF						12-11-0-7-8-9	1111 1111

ANSI-DEFINED PRINTER CONTROL CHARACTERS

(A in RECFM field of DCB)

Code	Action before printing record
blank	Space 1 line
0	Space 2 lines
-	Space 3 lines
+	Suppress space
1	Skip to line 1 on new page

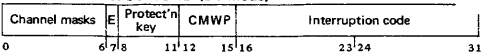
MACHINE INSTRUCTION FORMATS



CONTROL REGISTERS

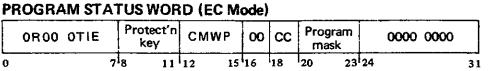
CR	Bits	Name of field	Associated with	Init.
0	0	Block-multiplex'g control	Block-multiplex'g	0
	1	SSM suppression control	SSM instruction	0
	2	TOD clock sync control	Multiprocessing	0
	8-9	Page size control	Dynamic addr. transl.	0
	10	Unassigned (must be zero)		0
	11-12	Segment size control		0
	16	Malfunction alert mask	Multiprocessing	0
	17	Emergency signal mask		0
	18	External call mask		0
	19	TOD clock sync check mask		0
	20	Clock comparator mask	Clock comparator	0
	21	CPU timer mask	CPU timer	0
	24	Interval timer mask	Interval timer	1
	25	Interrupt key mask	Interrupt key	1
	26	External signal mask	External signal	1
1	0-7	Segment table length	Dynamic addr. transl.	0
	8-25	Segment table address		0
2	0-31	Channel masks	Channels	1
8	16-31	Monitor masks	Monitoring	0
9	0	Successful branching event mask	Program-event record'g	0
	1	Instruction fetching event mask		0
	2	Storage alteration event mask		0
	3	GR alteration event mask		0
	16-31	PER general register masks		0
10	8-31	PER starting address	Program-event record'g	0
11	8-31	PER ending address	Program-event record'g	0
14	0	Check-stop control	Machine-check handling	1
	1	Synch. MCEL control		1
	2	I/O extended logout control	I/O extended logout	0
	4	Recovery report mask	Machine-check handling	0
	5	Degradation report mask		0
	6	Ext. damage report mask		1
	7	Warning mask		0
	8	Asynch. MCEL control		0
	9	Asynch. fixed log control		0
15	8-28	MCEL address	Machine-check handling	512

PROGRAM STATUS WORD (BC Mode)



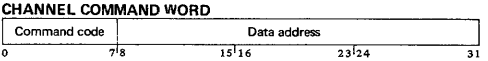
0–5 Channel 0 to 5 masks
6 Mask for channel 6 and up
7 (E) External mask
12 (C=0) Basic control mode
13 (M) Machine-check mask
14 (W=1) Wait state
15 (P=1) Problem state
32–33 (ILC) Instruction length code
34–35 (CC) Condition code
36 Fixed-point overflow mask
37 Decimal overflow mask
38 Exponent underflow mask
39 Significance mask

PROGRAM STATUS WORD (EC Mode)



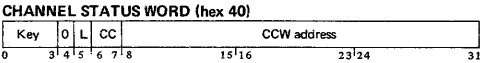
1 (R) Program event recording mask
5 (T=1) Translation mode
6 (I) Input/output mask
7 (E) External mask
12 (C=1) Extended control mode
13 (M) Machine-check mask
14 (W=1) Wait state
15 (P=1) Problem state
18–19 (CC) Condition code
20 Fixed-point overflow mask
21 Decimal overflow mask
22 Exponent underflow mask
23 Significance mask

CHANNEL COMMAND WORD



CD—bit 32 (80) causes use of address portion of next CCW.
CC—bit 33 (40) causes use of command code and data address of next CCW.
SLI—bit 34 (20) causes suppression of possible incorrect length indication.
Skip—bit 35 (10) suppresses transfer of information to main storage.
PCI—bit 36 (08) causes a channel program controlled interruption.
IDA—bit 37 (04) causes bits 8–31 of CCW to specify location of first IDAW.

CHANNEL STATUS WORD (hex 40)



5 Logout pending
6–7 Deferred condition code
32 (80) Attention
33 (40) Status modifier
34 (20) Control unit end
35 (10) Busy
36 (08) Channel end
37 (04) Device end
38 (02) Unit check
39 (01) Unit exception
40 (80) Program-controlled interruption
41 (40) Incorrect length
42 (20) Program check
43 (10) Protection check
44 (08) Channel data check
45 (04) Channel control check
46 (02) Interface control check
47 (01) Chaining check
48–63 Residual byte count for the last CCW used

PROGRAM INTERRUPTION CODES

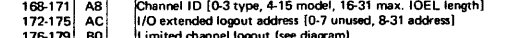
0001	Operation exception	000C	Exponent overflow excp
0002	Privileged operation excp	000D	Exponent underflow excp
0003	Execute exception	000E	Significance exception
0004	Protection exception	000F	Floating-point divide excp
0005	Addressing exception	0010	Segment translation excp
0006	Specification exception	0011	Page translation exception
0007	Data exception	0012	Translation specification excp
0008	Fixed-point overflow excp	0013	Special operation exception
0009	Fixed-point divide excp	0040	Monitor event
000A	Decimal overflow exception	0080	Program event (code may be combined with another code)
000B	Decimal divide exception		

FIXED STORAGE LOCATIONS

Area, dec.	Hex addr	EC only	Function
0- 7	0		Initial program loading PSW, restart new PSW
8- 15	8		Initial program loading CCW1, restart old PSW
16- 23	10		Initial program loading CCW2
24- 31	18		External old PSW
32- 39	20		Supervisor Call old PSW
40- 47	28		Program old PSW
48- 55	30		Machine-check old PSW
56- 63	38		Input/output old PSW
64- 71	40		Channel status word (see diagram)
72- 75	48		Channel address word [0-3 key, 4-7 zeros, 8-31 CCW address]
80- 83	50		Interval timer
88- 95	58		External new PSW
96-103	60		Supervisor Call new PSW
104-111	68		Program new PSW
112-119	70		Machine-check new PSW
120-127	78		Input/output new PSW
132-133	84		CPU address assoc'd with external interruption, or unchanged
132-133	84	X	CPU address assoc'd with external interruption, or zeros
134-135	86	X	External interruption code
136-139	88	X	SVC interruption [0-12 zeros, 13-14 ILC, 15:0, 16-31 code]
140-143	8C	X	Program interrupt. [0-12 zeros, 13-14 ILC, 15:0, 16-31 code]
144-147	90	X	Translation exception address [0-7 zeros, 8-31 address]
148-149	94		Monitor class [0-7 zeros, 8-15 class number]
150-151	96	X	PER interruption code [0-3 code, 4-15 zeros]
152-155	98	X	PER address [0-7 zeros, 8-31 address]
156-159	9C		Monitor code [0-7 zeros, 8-31 monitor code]
168-171	A8		Channel ID [0-3 type, 4-15 model, 16-31 max. IOEL length]
172-175	AC		I/O extended logout address [0-7 unused, 8-31 address]
176-179	B0		Limited channel logout (see diagram)
185-187	B9	X	I/O address [0-7 zeros, 8-23 address]
216-223	D8		CPU timer save area
224-231	E0		Clock comparator save area
232-239	E8		Machine-check interruption code (see diagram)
248-251	F8		Failing processor storage address [0-7 zeros, 8-31 address]
252-255	FC		Region code*
256-351	100		Fixed logout area*
352-383	160		Floating-point register save area
384-447	180		General register save area
448-511	1C0		Control register save area
512†	200		CPU extended logout area (size varies)

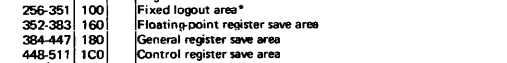
*May vary among models; see system library manuals for specific model.
†Location may be changed by programming (bits 8-28 of CR 15 specify address).

LIMITED CHANNEL LOGOUT (hex B0)



4 CPU
5 Channel
6 Main storage control
7 Main storage
8 CPU
9 Channel
10 Main storage control
11 Main storage
12 Control unit
16 Interface address
17-18 Reserved (00)
19 Sequence code
20 Unit status
21 Cmd. addr. and key
22 Channel address
23 Device address
24-25 Type of termination
00 Interface disconnect
01 Stop, stack or normal
10 Selective reset
11 System reset
28(A) I/O error alert
29-31 Sequence code

MACHINE-CHECK INTERRUPTION CODE (hex E8)



0 System damage
1 Instr. proc'g damage
2 System recovery
3 Timer damage
4 Timing facil. damage
5 External damage
6 Not assigned (0)
7 Degradation
8 Warning
14 Backed-up
15 Delayed
16 Uncorrected
17 Corrected
18 Key uncorrected
20 PSW bits 12-15
21 PSW masks and key
22 Prog. mask and CC
23 Instruction address
24 Failing stg. address
25 Region code
27 Floating-pt registers
28 General registers
29 Control registers
30 CPU ext'd logout
31 Storage logical
46 CPU timer
47 Clock comparator

DYNAMIC ADDRESS TRANSLATION

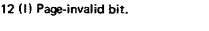
VIRTUAL (LOGICAL) ADDRESS FORMAT

Segment Size	Page Size		Segment Index	Page Index	Byte Index
64K	4K	Bits	8 - 15	16 - 19	20 - 31
64K	2K	0 - 7	8 - 15	16 - 20	21 - 31
1M	4K	are	8 - 11	12 - 19	20 - 31
1M	2K	ignored	8 - 11	12 - 20	21 - 31

SEGMENT TABLE ENTRY

*Normally zeros; ignored on some models. 31 (I) Segment-invalid bit.

PAGE TABLE ENTRY (4K)



12 (I) Page-invalid bit.

PAGE TABLE ENTRY (2K)

13 (I) Page-invalid bit.

HEXADECIMAL AND DECIMAL CONVERSION

From hex: locate each hex digit in its corresponding column position and note the decimal equivalents. Add these to obtain the decimal value.

From decimal: (1) locate the largest decimal value in the table that will fit into the decimal number to be converted, and (2) note its hex equivalent and hex column position. (3) Find the decimal remainder. Repeat the process on this and subsequent remainders.

Note: Decimal, hexadecimal, (and binary) equivalents of all numbers from 0 to 255 are listed on panels 9 - 12.

HEXADECIMAL COLUMNS												
6		5		4		3		2		1		
HEX	DEC	HEX	DEC	HEX	DEC	HEX	DEC	HEX	DEC	HEX	DEC	
0	0	0	0	0	0	0	0	0	0	0	0	
1	1,048,576	1	65,536	1	4,096	1	256	1	16	1	1	
2	2,097,152	2	131,072	2	8,192	2	512	2	32	2	2	
3	3,145,728	3	196,608	3	12,288	3	768	3	48	3	3	
4	4,194,304	4	262,144	4	16,384	4	1,024	4	64	4	4	
5	5,242,880	5	327,680	5	20,480	5	1,280	5	80	5	5	
6	6,291,456	6	393,216	6	24,576	6	1,536	6	96	6	6	
7	7,340,032	7	458,752	7	28,672	7	1,792	7	112	7	7	
8	8,388,608	8	524,288	8	32,768	8	2,048	8	128	8	8	
9	9,437,184	9	589,824	9	36,864	9	2,304	9	144	9	9	
A	10,485,760	A	655,360	A	40,960	A	2,560	A	160	A	10	
B	11,534,336	B	720,896	B	45,056	B	2,816	B	176	B	11	
C	12,582,912	C	786,432	C	49,152	C	3,072	C	192	C	12	
D	13,631,488	D	851,968	D	53,248	D	3,328	D	208	D	13	
E	14,680,064	E	917,504	E	57,344	E	3,584	E	224	E	14	
F	15,728,640	F	983,040	F	61,440	F	3,840	F	240	F	15	
0 1 2 3		4 5 6 7		0 1 2 3		4 5 6 7		0 1 2 3		4 5 6 7		
BYTE				BYTE				BYTE				

POWERS OF 2

2^n	n
256	8
512	9
1 024	10
2 048	11
4 096	12
8 192	13
16 384	14
32 768	15
65 536	16
131 072	17
262 144	18
524 288	19
1 048 576	20
2 097 152	21
4 194 304	22
8 388 608	23
16 777 216	24

$2^0 = 16^0$	
$2^4 = 16^1$	
$2^8 = 16^2$	
$2^{12} = 16^3$	
$2^{16} = 16^4$	
$2^{20} = 16^5$	
$2^{24} = 16^6$	
$2^{28} = 16^7$	
$2^{32} = 16^8$	
$2^{36} = 16^9$	
$2^{40} = 16^{10}$	
$2^{44} = 16^{11}$	
$2^{48} = 16^{12}$	
$2^{52} = 16^{13}$	
$2^{56} = 16^{14}$	
$2^{60} = 16^{15}$	

POWERS OF 16

16^n	n
1	0
16	1
256	2
4 096	3
65 536	4
1 048 576	5
16 777 216	6
268 435 456	7
4 294 967 296	8
68 719 476 736	9
1 099 511 627 776	10
17 592 186 044 416	11
281 474 976 710 656	12
4 503 599 627 370 496	13
72 057 594 037 927 936	14
1 152 921 504 606 846 976	15

Section 3 Contents

Functional Characteristics of Manual Controls

Source: GA22-7000 IBM System/370 Principles of Operation

The manual controls provided on the System/370 system console vary according to model. This list defines the functions of S/370 manual controls generally.

POWER-ON pushbutton	Starts a power-on sequence. Lights up red, light turns white after 30 seconds. Clear system reset occurs. System enters manual stop condition.
POWER-OFF key	Initiates a power-off sequence when the power-on key is lighted white or red.
START key	Starts instruction execution. Effective only if CPU is in stopped state.
STOP key	Puts CPU in stopped state.
RESTART key	Initiates restart interruption. Effective in both operating and stopped states.
EMERGENCY PULL switch	Turns off all power beyond the power-entry terminal on every unit that is part of the system or can be switched onto the system.
IMPL controls	Model dependent. Used for initial microprogram loading.
LOAD key	Loads an IPL program.
LOAD indicator	Goes on when the LOAD key is pressed, goes off when the IPL chain is broken.
LOAD UNIT-ADDRESS controls	Tells the system where to get the IPL program when you push the LOAD key.
TOD CLOCK key	Must be in ENABLE position to set clock.
DISPLAY and ENTER controls	Control of these functions on some models is on the system control panel; on other models, by use of console devices. CPU must first be placed in stopped state. Using these controls, you can display and enter information in main storage, in the general, floating-point, and control registers, the PSW, and the keys in storage.
ADDRESS COMPARE switch	Stops the CPU when it reaches any address you select in advance. Settings can be changed without disrupting CPU operations other than the stop.
INTERRUPT key	Interrupts program execution by causing an external interruption. Interrupt is taken when CPU is in operating state, otherwise it remains pending.
SYSTEM RESET key	Interrupts instruction processing and resets the CPU, channels, storage units and other CPU's.
ENABLE SYSTEM-CLEAR key	In conjunction with SYSTEM RESET key, resets the CPU, channels, - on-line nonshared control units, and I/O devices; and, in most models, clears registers to zeros. In conjunction with LOAD key, does the same except you must re-IPL.
RATE CONTROL	Sets the rate the CPU will operate at: PROCESS rate, normal speed; INSTRUCTION STEP rate, one whole instruction per push of the START key. Set when CPU is in stopped state. TEST indicator lights when RATE CONTROL is not set to PROCESS.

TEST indicator	Goes on when a manual control is not in its normal position or when a maintenance function is being performed for the CPU, channels, or storage.
STORE-STATUS key	Initiates store-status function. Function initiated on some models by pushbutton, on others by use of a special keyboard mnemonic or by CRT-menu selection. Effective only when CPU is in stopped state.
MANUAL indicator	Goes on when CPU is in stopped state.
WAIT indicator	Goes on when the CPU is in the wait state.
CHECK-STOP indicator	Goes on when the CPU is in the check-stop state. A CPU reset will turn it off.
THERMAL/CB POWER-CHECK indicator	Goes on when a thermal condition or a circuit-breaker trip, or both, are detected in the CPU complex. Turned off from CE power control panel.
SYSTEM indicator	Goes on when the CPU cluster meter or customer-engineer meter is running.

System/370 Model 115 and Model 125

Sources: GA33-1510 System/370 Model 115 Functional Characteristics
GA33-1509 System/370 Model 125 Procedures

Power-On Procedure

DANGER: Before switching on power, ensure that no person is exposed to risk and that all equipment covers are shut.

1. Ensure system diskette is inserted in console file.
2. Press POWER ON. Red light comes on.
3. IMPL is automatic if diskette is loaded as described in step 1. If not, wait 30 seconds for white light on POWER ON before IMPLing.

Power-Off Procedure

Before removing power:

1. Issue any special commands your operating system requires.
2. Unload tape units and disk drives.
3. Perform 'save usage counters' if needed.
4. Press POWER OFF. The Power-On key turns from white to red, then goes out.

To IMPL

1. Place Control diskette in the 33FD.
2. Press IMPL key. This loads all microprograms from the console file into subprocessors which have loadable control storages. A malfunction in the console file causes the File Check light to turn on.
3. During IMPL, 'IMPL IN PROGRESS' appears on the video screen.
4. 'SUCCESSFULLY LOADED' appears when loading is finished. The next message, 'PROGRAM LOAD', is the signal to begin the IPL procedure.

To IPL for First Time after Power-On

1. Key in specifications as soon as PROGRAM LOAD is displayed on line 13 of the screen.
2. Press ENTER.

   NOTE: If message 'IPL ERROR' or 'EC PSW ERR' appears on line 13 of the screen, reload with correct program. Press ENTER.

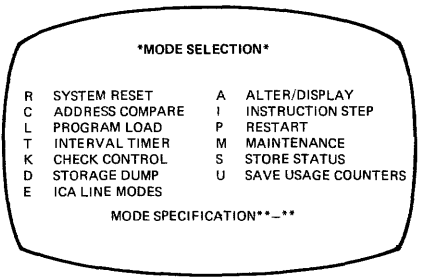
3. Proceed with usual operating procedures. Check for normal states across entire system.
4. Assign devices and start running jobs.

To Re-IPL

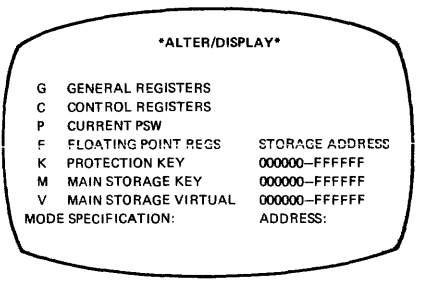
1. In order to get the PROGRAM LOAD display, press MODE SEL, key in L, and press ENTER. Specifications from the last IPL will be displayed.
2. If the specifications are to remain the same, press ENTER. If not, make changes and press ENTER.
3. Proceed with usual operating procedures. Check for normal states across entire system.
4. Assign devices and start running jobs.

To Display Registers, PSW, and Main Storage

1. Select ALTER/DISPLAY by keying A in the MODE SELECTION display and pressing ENTER.



2. Select the desired display from those listed on the ALTER/DISPLAY frame.



3. Key in the selector character: G for General-Purpose Register, P for Current PSW, etc. With Main Storage and Protection Key you must also key in the address.

4. Press ENTER.

To Alter Registers, PSW, and Main Storage

1. To change one or more of the digits in the display, move the cursor under the first digit to be changed.
2. Key in the new data. The new data appears on the line under the old data.
3. Before ENTER is pressed you can still change your input by using the cursor keys and entering the changes in the usual way.
4. Press ENTER. The new data replaces the old on the screen.

   NOTE: If INVALID CHARACTER appears on the screen, you entered a wrong character (either a nonhexadecimal or a nonbinary). The cursor marks the first invalid character. Key in the correct information and press ENTER.

Procedure after an Alter/Display

1. Press MODE SEL to get the ALTER/DISPLAY frame again; or
2. Press MODE SEL twice to get the MODE SELECTION frame; or
3. Press CNCL key to return the screen to the operating system and the START key to resume processing.

To Stop on Main Storage Address

1. Press MODE SEL. This brings the main set of modes to the screen.
2. Key in C on the MODE SELECT display to display ADDRESS COMPARE.
3. Press ENTER.
4. ADDRESS COMPARE shows 3 columns: Action, Compare Type, and Storage Address.
5. Key in S (stop) for Action; D (data store) for Compare Type, and search address (6-digit hex number). The machine will stop at that address.

To Clear Main Storage

Clear Reset is used normally only by the CE, but may be used by the operator if a machine error is suspected.

1. Press MODE SEL.
2. Key in RC.
3. Press ENTER.

This clears all of main storage, the registers, and PSW. All timers except TOD clock are reset. The channels and CPU are reset and control registers are initialized.

When 'RESET COMPLETE' appears on the screen,

4. Press the CNCL and START keys to release the screen to the operating system and resume processing.
5. Continue operating.

System/370 Model 135

Source: GC38-0005 System/370 Model 135 Procedures

Power-On Procedure

DANGER: Before switching on power, ensure that no person is exposed to risk and that all equipment covers are shut.

1. Ensure that console file contains IMPL disk (green label) and console file cover is properly closed.
2. Press POWER ON, and wait two minutes.
3. Press LAMP TEST to check lamps.
4. System is ready when POWER ON white light is on.

Power-Off Procedure

1. Preparatory to turning power off:

   a. Unload all disk and tape drives.
   b. Open or disengage the print unit release lever on all printers using print train cartridges.

2. Depress the POWER OFF pushbutton.

To IMPL

CAUTION: Do not ready any I/O devices during IMPL.

1. Ensure that switches are set to normal positions, console file contains IMPL disk (green label), and console-printer keyboard is ready.
2. Press START CONSOLE FILE. Light changes from red to white to off.
3. Wait for IMPL REQD indicator to go off and the MAN indicator to turn on before IPLing.

To IPL

1. Ensure that IMPL REQD indicator is off, switches are set to normal positions, and MAN indicator is on.
2. Load and make ready the IPL input device.
3. Select IPL input device address on rotary switches C through E (LOAD UNIT ADDRESS).
4. Press LOAD.
5. Begin operating system procedures. Check for normal status of entire system before running jobs.
6. Assign devices and start running jobs.

To Display Registers, PSW, and Main Storage

1. Press STOP and wait until MAN indicator comes on.
2. Press ALTER/DISPLAY at console-printer keyboard and wait until PROCEED light comes on.
3. Type 2-character mnemonic (D plus appropriate second letter) and hex address. No address is necessary after P (PSW) and T (Store Status).

ALTER/DISPLAY CHART

Mnemonic		*Function/Storage Type*	*Address Range (Model Dependent)*	
Alter	*Display*			
AM	DM	Main storage	000000-07FFFF	Use the number of digits indicated. If necessary, complete the correct number of digits by inserting zeros as appropriate
†	DS	Control storage	0000-DFFE*	
AG	DG	General register	0-F	
AF	DF	Floating-point register	0,2,4,6	
AP	DP	Program status word	None	
AC	DC	Control register	0-F	
AK	DK	Storage key	000000-07FFFF	
AR	DR	Transmission rate ††	1-8 (line number)	
AV	DV	Virtual storage **	000000-FFFFFF	
ST		Store status	None	

4. After contents are displayed, press END at console-printer keyboard.
5. To resume operations, press START.

To Alter Registers, PSW, and Main Storage

1. Press STOP and wait until MAN indicator comes on.
2. Press ALTER/DISPLAY at console-printer keyboard and wait until the PROCEED light comes on.
3. Select a 2-character mnemonic (A plus appropriate second letter) from the Alter/Display Mnemonics chart, and type the mnemonic and hex address.
4. Enter new characters in positions occupied by characters to be replaced. Reach required positions by repeating characters. In the case of the current PSW, retype up to and including the new bits desired, and press RETURN. It is unnecessary to retype the remaining bits.
5. Press END at console-printer keyboard.
6. Press START to resume operations.

To Stop on Main Storage Address

1. Press STOP.
2. Set STORAGE SELECT to MAIN STORAGE.
3. Set INTERVAL TIMER switch to DISABLE (if required).
4. Set STORAGE ADDRESS rotary switches A through E to desired address.
5. Set COMPARE ADDRESS to ANY.
6. Set appropriate ADDRESS COMPARE CONTROL switch to STOP.
7. Press START.

To resume normal processing after CPU stops at the desired address:

1. Set ADDRESS COMPARE to ANY,
   ADDRESS COMPARE CONTROL to SYNC/NORMAL,
   NORMAL INTERVAL TIMER to NORMAL (if required).
2. Press START.

To Clear Main Storage

The need for this procedure is indicated by a message at the console-printer keyboard or by an unexplained CPU wait state (WAIT indicator on).

1. Press and hold in ENABLE SYSTEM CLEAR.
2. Press SYSTEM RESET (once only).
3. Release ENABLE SYSTEM CLEAR.
4. Perform IPL procedure.
5. Continue normal processing.

Hard Stop Option

1. The hardstop indicator (white light) comes on whenever the CPU stops. CPU hardware errors are recorded in a logout area of main storage by the CPU. If the software does not create an Environmental Data Recording Set (ERDS), run the SEREP (stand-alone) program to obtain a printout of the latest error information. Keep the EREP or SEREP printouts because they are useful to the CE.
2. On advice of the CE you may then set the CHECK CONTROL switch to CONDITIONAL HARD STOP and operate the CPU.

Power-On Procedure

DANGER: Before switching on power, ensure that no person is exposed to risk and that all equipment covers are shut.

1. Insert *370 microprogram disk in console file and close cover.
2. Press the POWER ON key.
3. IMPL is automatic if:

   a. Rotary switches are in their normal processing positions,
   b. the ADDRESS COMPARE CONTROL switch is set to SYNC/NORM,
   c. *370 microprogram disk is mounted in the console file,
   d. console printer has paper and is ready to print the IMPL GO-NO GO-COMPLETE message.

This ends the Power-On procedure for MOD 145--No Feature Installed. For MOD 145 with CTCA or ISC feature, continue with steps specified under that feature.

Mod 145--Channel-to-Channel Adapter (CTCA) Feature Installed

4. Wait for I/O INFC DSBLD indicator to turn on.
5. Move the I/O INTERFACE switch to the ENABLE position. The adapter is available to the program when the I/O INFC DSBLD indicator turns off.

Mod 145--Integrated Storage Control (ISC) Feature Installed

4. Wait for the IMPL REQD indicator to turn off.
5. Move the I/O INTERFACE A and B switches to the ON position. The ISC is available to the program when the I/O INTFS DSBLD indicator turns off.

Power-Off Procedure

1. Preparatory to turning power off:

   a. Unload all disk and tape drives.
   b. Open or disengage the print unit release lever on all printers using print train cartridges.
2. Continue with steps applicable to your system.

Mod 145--No Features Installed

3. Press the STOP key.
4. Press the POWER-OFF key. NOTE: Do not turn power back on for at least ten seconds.

Mod 145--Channel-to-Channel Adapter (CTCA) Feature Installed

3. Inform the operator of the other system that the channel to channel adapter is to be removed from use.
4. Move the I/O INTERFACE switch to the DISABLE position.
5. Wait for the I/O INFC DSBLD indicator to turn on.
6. Press the POWER OFF key. NOTE: Do not turn power back on for at least ten seconds.

Mod 145--Integrated Storage Control (ISC) Feature Installed

3. Inform the operator of the other system that the ISC feature is to be removed from use (if applicable).
4. Move the I/O INTERFACE A and B switches to the OFF position.
5. Wait for the I/O INTFS DSBLD indicator to turn on.
6. Press the POWER OFF key. NOTE: Do not turn power back on for at least ten seconds.

To IMPL

1. Ensure that forms are inserted in the console printer and the *370 microprogram disk is mounted in the console file.
2. Set all rotary switches to their normal operating position. Ensure that the ADDRESS COMPARE CONTROL toggle switch is set to SYNC/NORM.
3. If power is not on, press POWER-ON key. IMPL occurs automatically. If power is on, press START CONSOLE FILE key to initiate the IMPL.
4. The IMPL REQD and CF POWER ON indicators turn on. The START CONSOLE key turns red, then white, as the console file starts reading.
5. The console file powers off automatically when control storage is loaded, and the CF POWER ON indicator and START CONSOLE FILE key light turn off.
   The System Reset routine executes, the IMPL REQD indicator turns off, and the CPU enters the soft-stop state (MAN indicator on). IMPL operation takes approximately 35 seconds.

To IPL

1. Load and ready the System Resident (SYSRES) device.
2. Dial the address of the IPL device into LOAD UNIT ADDRESS switches FGH.
3. Press the LOAD key. After an automatic system reset, the IPL operation starts and the LOAD indicator turns on.
4. When the IPL is complete, the LOAD indicator turns off and the system either executes the program or enters the soft-stop state, awaiting your action.

Loading the Secondary Nucleus (OS)

1. Place the program to the desired I/O device and make that device ready.
2. Set the three LOAD UNIT ADDRESS switches to the SYSRES address.
3. Set RATE switch to INSTRUCTION STEP.
4. Press LOAD button. Load light comes on and system goes into manual state.
5. Press Alter/Display Mode on PR-KB. Enter in location X'08' the EBCDIC character to be appended by IEANUCO. The two hex digits may range from F2 to F9 (determined by last character of nucleus name).
6. Set RATE switch to PROCESS.
7. Press START.

To Display Registers, PSW, and Main Storage

Display operations can be performed from the PR-KB.

1. Press the STOP key or set the RATE switch to either INSTRUCTION STEP or SINGLE CYCLE HARD STOP.
2. Press the ALTER/DISPLAY key.
3. Wait for both ALTER/DISPLAY MODE and PROCEED indicators to turn on.
4. Select from the Alter/DISPLAY chart below the appropriate 2-character mnemonic, and type the mnemonic and address of the information to be displayed.
5. When zeros are typed to the left of the address, a new line operation is started automatically. When zeros are not inserted, the RETURN key must be pressed.
6. To continue program processing after the display operation is completed, return the RATE switch to PROCESS and press the Start key.

Alter/Display Chart

STORAGE AREA	ALTER MNEMONIC	DISPLAY MNEMONIC	ADDRESS RANGE
MAIN STORAGE	AM	DM	000000-0FFFFF*
STORAGE KEY	AK	DK	000000-0FFFFF*
CONTROL REGISTER	AC	DC	0-F
GENERAL REGISTER	AG	DG	0-F
FLOATING-POINT REGISTER	AF	DF	0,2,4,6
CURRENT PSW	AP	DP	None required
STORE STATUS	NONE	ST	None required
VIRTUAL STORAGE	AV	DV	000000-FFFFFF
*The upper boundary is movable and depends upon the capacity of main storage.			

To Alter Registers, PSW, and Main Storage

1. Alter operations can be performed from the PR-KB. Press the STOP key or set the RATE switch to either INSTRUCTION STEP or SINGLE CYCLE HARD STOP.
2. Press the ALTER/DISPLAY key.
3. Wait for both the ALTER/DISPLAY MODE and PROCEED indicators to turn on.
4. Select the appropriate 2-character mnemonic from the Alter/Display chart and type the mnemonic and address of the information to be altered.
5. Enter data, using the space bar to skip over positions not being altered. The data in the skipped-over positions remains unchanged and prints out each time the space bar is operated.
6. To end the alter operation, press the ALTER/DISPLAY key or the END key.
7. To resume program processing, return the RATE switch to PROCESS and press the START key.

To Stop on Main Storage Address

1. Press STOP key. MAN indicator comes on.
2. Set STORAGE SELECT switch to MAIN STORAGE position.
3. Set main storage address in STORAGE SELECT rotary switches CDEFGH.
4. Set ADDRESS COMPARE to ANY. NOTE: To guarantee a match on instruction addresses, the I-COUNTER position (real or logical) must be used.
5. Set ADDRESS COMPARE CONTROL toggle switch to STOP.
6. Press START key.

TO Clear Main Storage

1. Hold the ENABLE SYSTEM CLEAR key in the operated position.
2. Press the SYSTEM RESET or LOAD key.
3. Release the ENABLE SYSTEM CLEAR key.

Hard Stop Option

On getting a red light error and at the suggestion of service personnel:

1. Set CHECK CONTROL switch to STOP AFTER LOG. The LOG PRES indicator comes on after an error occurs and the machine stops.
2. IPL the SEREP deck and save printout for CE.
3. Press SYSTEM RESET and begin operating.
4. Should second error occur, call CE.

Power-On Procedure

DANGER: Before switching on power, ensure that no person is exposed to risk and that all equipment covers are shut.

1. Press the POWER-ON key. The key backlights red when pressed and turns white when the power-on sequence is complete.

Power-Off Procedure

1. Preparatory to turning power off:
   a. Unload all disk and tape drives.
   b. Open or disengage the print release lever on all printers that use print train cartridges.
2. Press the CPU STOP key.
3. Press the POWER-OFF key. This removes power from the CPU and online I/O units.

To IPL

1. Load and ready the IPL device.
2. Dial the address of the IPL device into LOAD UNIT switches FGH.
3. Press the LOAD key. The LOAD indicator turns on.
4. When IPL is complete, the LOAD indicator turns off and the system either executes the program or enters the soft-stop state, awaiting operator action.

Loading a Secondary Nucleus (OS)

After step 2 above.

1. Set RATE mode switch to INSN STEP.
2. Press the LOAD key.
3. Alter storage location 08 to the two hex digits designating the secondary nucleus. The two hex digits may range from F2 to F9 (determined by last character of nucleus name).
4. Set RATE switch to PROCESS.
5. Press START key.

To Display Registers, PSW, and Main Storage

Display operations are performed through the PR-KB.

1. Press the CPU STOP key (machine in manual state).
2. Press the ALTER/DISPLAY key.
3. Wait for both ALT/DISP MODE and PROCEED to turn on.
4. Select the 2-character mnemonic (D plus the appropriate second letter) from the Alter/Display chart, and type the mnemonic and the address of the information to be displayed.
5. When you type zeros to the left of the address, the operation is started automatically. If you do not type zeros, press the RETURN key to start display.
6. Data is printed starting at the address specified and continues until the ALTER/DISPLAY or END key is pressed.

   NOTE: For Alter/Display of general-purpose and floating-point registers, a wraparound is performed (F to 0 for GP registers and 6 to 0 for floating-point registers).

7. Press ALTER/DISPLAY key for the PR-KB to remain in alter/display mode (ALT/DISP MODE indicator stays on), or press the END key to terminate alter/display mode.

ALTER/DISPLAY CHART

STORAGE AREA	ALTER MNEMONIC	DISPLAY MNEMONIC	ADDRESS RANGE
MAIN STORAGE	AM	DM	000000-FFFFFF
GENERAL-PURPOSE REGISTER	AG	DG	0-F
FLOATING-POINT REGISTER	AF	DF	0,2,4,6
CURRENT PSW	AP	DP	NONE REQUIRED
CONTROL REGISTERS	AC	DC	0–F

To Alter Registers, PSW, and Main Storage

1. Press the CPU STOP key (machine in manual state).
2. Press the ALTER/DISPLAY key.
3. Wait for both ALT/DISP MODE and PROCEED to turn on.
4. Select the 2-character mnemonic (A plus the appropriate second letter) from the Alter/Display chart, and type the mnemonic and the address of the information to be altered.
5. Enter data, using the space bar to skip over positions not being altered. The data in the skipped-over positions remains unchanged and prints out each time the space bar is operated.
6. To end the alter operation, press the ALTER/DISPLAY key or END key. If you press the ALTER/DISPLAY key, the PR-KB remains in alter/display mode. If you press the END key, alter/display mode is terminated.

To Stop on Main Storage Address

1. Press the STOP key (machine in manual state).
2. Set STORAGE SELECT switch to MAIN.
3. Set ADDRESS COMPARE switch to ANY.
4. Set the address of the desired storage address in console switches CDEFGH.
5. Set the ADDRESS COMPARE (SAR) toggle switch to STOP.
6. Press the START key.

To Clear Storage

1. Hold down the ENABLE SYSTEM CLEAR key.
2. Press the SYSTEM RESET or LOAD key. All of main storage including the storage protect keys will be cleared to zeros.

Hard Stop Option

The HARD STOP switch is used with operating systems that do not have the retry facilities inherent in Model 155 hardware. At this setting, the machine stops when parity/machine checks occur. After a hardstop, the operator should return CHECK CONTROL to PROCESS, run the SEREP program, and save the results for the CE.

Power-On Procedure

DANGER: Before switching on power, ensure that no person is exposed to risk and that all equipment covers are shut.

1. Insert the IMPL diskette in the console file. Carefully close cover.
2. Press the POWER ON pushbutton. This button lights red, then white upon completion of the power-on sequence. An IMPL is automatically initiated.

Power-Off Procedure

1. Preparatory to turning power off:

   a. Unload all disk and tape drives.
   b. Open or disengage the print release lever on all printers that use print train cartridges.

2. Press the POWER OFF pushbutton to initiate the power-off sequence. The contents of main storage are not preserved.

To IMPL

1. Press IMPL pushbutton. This causes the initial microprogram load of the display console and CPU reloadable control stores to occur. During IMPL, the message 'IMPL IN PROCESS' is displayed.
2. On completion of IMPL the configuration frame appears. The system is IMPLed in display mode. If PR-KB mode is desired, or timer options, select them on this frame.
3. Exit from the configuration frame by selecting MANUAL with the light pen or by pressing MODE SEL on the keyboard.

To IPL

1. Enter load unit address and select 4 under 0-OPERATOR FUNCTIONS or key in letter O and 4, followed by letter "L" and 3-digit address.
2. Select X-EXECUTE OPERATOR FUNCTION or key in X. Upon completion of a successful IPL the program frame appears.
3. Respond to system messages that appear on the screen.
4. Set time and date.

Loading a Secondary Nucleus (OS)

Follow the procedure shown for the Mod 155, using either the PR-KB or the light pen.

To Display Registers, PSW, and Main Storage

1. Press STOP key.
2. Press MODE SEL to display manual frame.
3. Select '3 ALTER/DISPLAY' under FRAME CONTROL or key in F3.
4. Select D under FUNCTION on the ALTER/DISPLAY frame, or key in D.
5. Select or key in the letter of the facility to be displayed.
6. Key in address--none necessary for general registers and PSW.
7. Press ENTER. The contents of the facility selected will be displayed in the center of the screen.

To Alter Registers, PSW, and Main Storage

1. If the system is in Alter/Display mode, press CANCEL key. This will re-initialize Alter/Display. If the system is in Program mode, (a) press STOP key; (b) press MODE SEL to display Manual frame; select '3 ALTER/DISPLAY' or key in F3.
2. Select A under FUNCTION on the ALTER/DISPLAY frame, or key in A.
3. Select or key in the letter of the facility to be altered.
4. Key in address and PSW.
5. Alter data. As the data is entered, the digit appears under the old value and the cursor is spaced forward.
6. To store altered data, select the ENTER function by use of the light pen or press ENTER key. If data to be altered is on the top line, the ENTER function must be selected prior to the New Line function, otherwise the data remains unaltered.
7. After altering data, press MODE SEL once to return to manual frame; twice to return to program frame.

To Stop on Main Storage Address

1. Press MODE SEL to display manual frame.
2. Select 1 ANY and 5 STOP under S-SAR COM SEL (REAL), or key in S1 and S5.
3. Key in E and address of main storage.
4. Press ENTER key.

To Clear Main Storage

1. Select O-6 SYS RESET CLEAR under O-OPERATOR FUNCTIONS, or key in letter O-6.
2. Press ENTER key.

Hard Stop Option

After a hardstop:

1. Return CHECK CONTROL to PROCESS.
2. Select SERVICE frame.
3. Select INDEX frame.
4. Select EXTERNAL DIAGNOSTIC frame.
5. Be sure "N" diskette is inserted in IGAR2.
6. Load "N" disk.
7. PROGRAM frame will be displayed after "N" disk load. Make entries per questions asked.
8. Save the results for the CE.

In hardstop mode, the CPU clocks are stopped by any error that causes a machine trap. If CE advises running in hard stop mode, start the clocks. This will cause the system to run as if it were in PROCESS mode.

System/370 Model 165

Source: GA22-6969 System/370 Model 165 Operating Procedures

Power-On Procedure

- Check doors, feeds, cards and/or paper.
- Check tapes, disks, and two-channel switch, if applicable.
- Check coolant and MG power, if applicable.

1. Press POWER ON (turns red).
2. Wait; POWER ON turns white.
3. If manual light does not turn on, check CONSL FILE light. If on:
   a. Set RSDT/NONRSDT to RSDT.
   b. Set FILE SECTION SELECT to 0.
   c. Press LOAD MD.

4. If manual light is on, check I/O.
   a. 2250–Press POWER ON (backlight).
   b. Disks–Set ENABLE and START.
   c. 2701–Set to ENABLE.

Power-Off Procedure

1. Issue WRITELOG and HALT commands.
2. Press STOP to turn manual light on.
3. Perform two-channel switch procedure, if applicable.
4. Check tapes; press RESET and LOAD REWIND. After rewind, press UNLOAD and RESET.
5. Check disks; switch to STOP.
6. Press POWER OFF (backlight off).
7. Check coolant and MG power, if applicable.

To IPL

1. Set LOAD UNIT switches to residence volume address.
2. Hold SYSTEM CLEAR; press LOAD. Manual light goes off, LOAD light comes on, and system reads in the IPL program.
3. When LOAD light goes off, IPL is in and running.
4. Reply to system messages and set TOD clock.

Loading a Secondary Nucleus (OS)

1. Set LOAD UNIT switches to residence volume address.
2. Set RATE switch to INSN STEP.
3. Press the LOAD key.
4. Use the Alter procedure to store, in location 08 (hex), the two hex digits designating the secondary nucleus.
5. Set RATE switch to PROCESS.
6. Press START key.

To Display General Registers

1. Press STOP
2. Set CRT MODE SELECT to CE and MANUAL ENTRY SELECT to MCAR.
3. Set STORAGE SELECT to GEN PUR.
4. Press ⇒ until cursor underscores high-order second byte.
5. Enter 6-digit hex address via data keys. (If error is made, press ⇒ until wraparound, then return to desired byte and enter correct data.)
6. When 6-digit address shows at MCAR, press DISPLAY. See eight bytes of storage displayed at MCDR on the CRT.
7. To see next doubleword, press ADV ADDRESS, then press DISPLAY.
8. To resume, set CRT MODE SELECT to OP and press START.

To Alter (Load into) General Registers

1. Perform steps 1-6 of "Display General Register".
2. Set MANUAL ENTRY SELECT to MCDR. Check that the ⇒ underscores desired byte.
3. Enter desired data via data keys. (If error is made, press ⇒ until wraparound, then return to desired byte and enter correct data.)
4. When the right-half of MCDR shows desired data (four bytes), press STORE. To verify, press DISPLAY.
5. To resume, set CRT MODE SELECT to OP and press START.

To Display Current PSW

1. Press STOP.
2. Set CRT MODE SELECT to CE.
3. See bits 40-63 at IC on CRT.
4. See bits 0-15 and 32-39 at image A3 on indicator viewer. (Bits 16-31 are 0's.)
5. To resume, set CRT MODE SELECT to OP and press START.

To Alter (Load) Current PSW

1. Perform steps 1-4 of "Display Current PSW".
2. Set MANUAL ENTRY SELECT to MCDR.
3. Enter desired data via data keys. (If error is made, press ⇒ until wraparound, then return to desired byte and enter correct data.)
4. When all eight bytes are in MCDR, press SET PSW. To verify, perform steps 1-4 of "Display Current PSW".
5. To resume, set CRT MODE SELECT to OP and press START.

To Display Main Storage

1. Press STOP.
2. Set CRT MODE SELECT to CE and MANUAL ENTRY SELECT to MCAR.
3. Set STORAGE SELECT to MAIN STOR.
4. Press ⇒ until cursor underscores second byte.
5. Enter six-digit hex address via data keys. (If error is made, press ⇒ until wraparound, then return to desired byte and enter correct data.)
6. When six-digit address shows at MCAR, press DISPLAY. See eight bytes of storage displayed at MCDR on the CRT.
7. To see next doubleword, press ADV ADDRESS, then press DISPLAY.
8. To resume, set CRT MODE SELECT to OP and press START.

To Alter (Store into) Main Storage

1. Perform steps 1-6 of "Display Storage".
2. Set MANUAL ENTRY SELECT to MCDR. Press ⇒ until cursor underscores desired byte.
3. Enter desired data via data keys. (If error is made, press ⇒ until wraparound, then return to desired byte and enter correct data.)
4. When MCDR shows desired data (eight bytes), press STORE. To verify, perform steps 1-7 of "Display Storage".
5. To resume, set CRT MODE SELECT to OP and press START.

To Stop on Main Storage Address (Compare Stop)

1. Press STOP. Set STORAGE SELECT to MAIN STOR.
2. Set CRT MODE SELECT to CE.
3. Set ADDRESS COMPARE/SYNC to IC.
4. Set stop on compare (MS) to STOP.
5. Set CS/MS to MS.
6. Set MANUAL ENTRY SELECT to MRAR.
7. Press ⇒ until cursor underscores second byte in MRAR.
8. Enter 6-digit hex stop address via data keys. (If error is made, press ⇒ until wraparound, then return to desired byte and enter correct data.)
9. Set CRT MODE SELECT to OP; press START.
10. To resume, set CS/MS to CS/MS, stop on compare (MS) to NORM, and press START.

To Clear Main Storage (Clear Storage)

1. Hold SYSTEM CLEAR; press SYSTEM RESET.
2. Release SYSTEM CLEAR; manual light turns on.
3. Perform IPL.

Hard Stop Option

If both wait and system lights are off, possible hardstop may be assumed. If no special procedures are provided by service personnel, follow procedures in Hardstop option, listed below.

1. Set MACHINE CHECK to STOP ON CHK.
2. At stop, press STOP, CHECK RESET, and START.

Power-On Procedure

DANGER: Before turning on the system, check all peripheral units externally. Do not mount tape reels until after power-on.

1. Press POWER ON (turns red).
2. Wait about one minute until POWER ON turns white.
3. If the manual light does not turn on after approximately two minutes, follow this procedure:
   a. Set RSDT/NON RSDT to RSDT.
   b. Set FILE SECTION SELECT to 0.
   c. Press LOAD MD. The manual light should turn on within one minute.

Power-Off Procedure

Before initiating the power-off sequence, issue Writelog and Halt commands. If manual light is not on, press STOP; the manual light will come on. Perform "Two-Channel Switch procedure" if applicable.

1. Check all tape units. Place units in unload state by pressing RESET and LOAD REWIND. After rewind is completed, press UNLOAD on each tape unit. Press RESET to shut power window.
2. Check all disk drives. Place drives in unload state by switching to STOP on each disk drive that is running. (Disk drives must be individually turned off before power is turned off.)
3. Press POWER OFF. Power is sequenced down automatically. POWER ON light goes off.
4. Continue power-off procedures for peripheral equipment not connected to the power-off sequence.

To IPL

1. Set LOAD UNIT switches to SYSRES volume address.
2. Press ENABLE SYSTEM CLEAR and LOAD simultaneously. Pressing these pushbuttons starts IPL, but first clears storage. Manual light goes off, LOAD light comes on, and system reads in the IPL program.
3. When LOAD light goes off, IPL operation is successfully completed.
4. Reply to system messages and set TOD clock.

Loading a Secondary Nucleus (OS)

Follow the procedure shown for the Mod 165, using either the PR-KB or the light pen.

To Display General Registers

1. Press STOP. Manual light comes on.
2. Set CRT MODE SELECT to CE
3. Set STORAGE SELECT to GEN PUR.
4. Set MANUAL ENTRY SELECT to MCAR.
5. Press cursor advance key ⇨ until the cursor underscores the first (high-order) byte in MCAR.
6. Enter two hex digits (to select desired register) by pressing the data keys. Use 00 to 0F for 16 general registers.
7. Press DISPLAY. The contents of the addressed general register are displayed on the CRT in the right half of the MCDR.
8. Restore CRT MODE SELECT to OP.
9. Press START to resume processing.

To Alter (Store in) General Registers

1. Perform steps 1 through 7 above.
2. Set MANUAL ENTRY SELECT to MCDR.
3. Make certain the cursor is underlining the first byte to be changed. Enter the data desired by pressing the data keys. In case of error, press the cursor advance key ⇒ until wraparound occurs, then return to the byte desired and enter the correct data.
4. Press STORE. Four bytes (right half of MCDR) are loaded into the general register selected.
5. Press DISPLAY to verify the load operation.
6. Restore CRT MODE SELECT to OP.
7. Press START to resume processing.

To Display Current PSW

1. If the manual light is not on, press STOP.
2. Set CRT MODE SELECT to CE. The PSW is displayed in portions. The last portion (bits 40-63) of the instruction address is directly displayed on the right side of the CRT, in the space designated IC. The entire first word (less the interruption code), as well as bits 32-39 (first portion of second half of current PSW) may be seen in image A3 of the indicator viewer.
3. Restore CRT MODE SELECT to OP when processing is to continue.

To Alter (Load) Current PSW

1. Press STOP. Manual light turns on.
2. Set CRT MODE SELECT to CE.
3. Set MANUAL ENTRY SELECT to MCDR.
4. Enter the PSW data by pressing the data keys; the cursor indicates what is actually entered at a specified location.
5. When all eight bytes of the MCDR are set as desired in the new current PSW, press SET PSW. Verify change by displaying current PSW. (The only portion not displayed is the interruption code, which should be zero.)
6. Restore CRT MODE SELECT to OP position.
7. Press START to resume processing.

To Display Main Storage

The CRT displays eight bytes, starting with the real location addressed.

1. Press STOP. Manual light turns on.
2. Set CRT MODE SELECT to CE.
3. Set STORAGE SELECT to MAIN STOR.
4. Set MANUAL ENTRY SELECT to MCAR to enter the real address.
5. Press the cursor advance key ⇒ until the cursor underscores the second byte in MCAR. (The first byte is ignored.)
6. Enter a 6-digit hex address by pressing the data keys. As each key is pressed, the appropriate digit appears in the MCER. As every second digit completes a byte, that byte appears in the MCAR and the cursor advances to the next byte.
7. Press DISPLAY. Eight bytes of storage are displayed at MCDR on the CRT display. To display the next doubleword of main storage, proceed with step 8.
8. Press ADV ADDRESS, then press DISPLAY. ("Blinking" bytes denote bad parity. Press CHECK RESET to clear pending errors.)
9. Restore CRT MODE SELECT to OP.
10. Press START to resume processing.

To Alter (Store into) Main Storage

Every store operation should be preceded by a display operation to prevent destruction of data by doubleword storing. For real addresses, use "Display Main Storage" procedure; for logical addresses, use "Translate Address and Display Main Storage" procedure shown after this procedure.

1. Perform steps 1 through 7 of "Display Main Storage" or "Translate Address and Display Main Storage."
2. Set MANUAL ENTRY SELECT to MCDR.
3. Press cursor advance key ⇒ until the cursor underscores the byte in MCDR where the data is to be entered.
4. Enter the data change by pressing the data keys. As soon as the byte is entered in the MCER, it is transferred to the MCDR where it can be checked for accuracy. If an error occurs, press the cursor advance key until wraparound occurs, and return to the byte desired. Enter the correct data.

Translate Address and Display Main Storage

The CRT displays eight bytes, starting with the logical location addressed.

1. Press STOP. Manual light turns on.
2. Set CRT MODE SELECT to CE.
3. Set STORAGE SELECT to MAIN STOR.
4. Set MANUAL ENTRY SELECT to MCAR to enter the logical (virtual) address.
5. Press the cursor advance key ⇒ until the cursor underscores the second byte in MCAR. (The first byte is ignored.)
6. Enter a six-hex-digit logical address by pressing the data keys. As each key is pressed, the appropriate digit appears in the MCER. As every second digit completes a byte, that byte appears in the MCAR and the cursor advances to the next byte.
7. Press TSLT ADR & DISPLAY MAIN. The real address replaces the logical address in MCAR, and the data at the real address appears in MCDR. If zeros appear in both the MCAR and MCDR, either a translation exception associated with the specified logical address has occurred, or the resulting real address is invalid for the system.
8. Restore CRT MODE SELECT to OP.
9. Press START to resume processing.

To Stop on Main Storage Address

1. Press STOP. Manual light turns on.
2. Set STORAGE SELECT to MAIN STOR.
3. Set ADDRESS COMPARE/SYNC: to IC for a match between the IC and the logical address set in the MRAR; or
   to CHAN for a match between a real address set in the MRAR and a main storage address selected by a channel; or
   to CPU/CHAN for a match between a real address set in the MRAR and an address selected either by the CPU or by the channels; or
   to CPU (REAL) for a match between the address selected by the CPU and the real address set in the MRAR; or
   to CPU (LOGICAL) which is the same as "Real Address" except that a logical address must be entered in the MRAR.
4. Set CS/MS to MS; set stop on compare (MS) to STOP.
5. Set CRT MODE SELECT to CE.
6. Set MANUAL ENTRY SELECT to MRAR.
7. Press cursor advance key ⇒ until the cursor underscores the second byte in MRAR displayed on the CRT. (Using a six-byte address, ignore the first MRAR byte.)
8. Enter six-hex-digit logical address (where stop is desired) by pressing the data keys. As each key is pressed, the appropriate digit appears in the MCER. As every second digit completes a byte, that byte appears in the MRAR and the cursor advances to the next byte. If an error occurs, press the cursor advance key until wraparound occurs, and return to the byte desired, then enter the correct digits.
9. Return CRT MODE SELECT to OP.
10. Press START to resume processing.
11. When the CPU stops at the desired compare stop, reset CS/MS to CS/MS, reset stop on compare (MS) to NORM, and press START to resume processing.

To Clear Main Storage

Under normal operation, it is unnecessary to clear storage because the operating system provides this function as required.

1. Depress and hold ENABLE SYSTEM CLEAR.
2. Press SYSTEM RESET. Manual light comes on.
3. Re-IPL.

Hard Stop Option

The hardstop option is normally specified for limited operation and should be used only on recommendation of the service personnel. In this case, MACHINE CHECK is set to STOP ON CHK and is left in this position. At stop time:

1. Record all check lights that are turned on; save the information for the service personnel.
2. Re-IPL, or see appropriate operating system operator's library manual.

Power-On Procedure

DANGER: Before turning on the system, ensure that no person is exposed to risk and check all peripheral units externally. Check that doors are properly closed, feeds not impeded, and paper and card supplies suitable to permit power-on sequencing.

1. Check panel light coolant check or coolant water temperature gage for normal setting before power-on sequence.
2. Press POWER ON (operator control panel); the backlighted key should turn red immediately.
3. At the completion of normal power-on sequence (a matter of seconds), the POWER ON backlight turns white. If, after 90 seconds, POWER ON does not light, check to see whether EMERGENCY PULL has been pulled.

Power-Off Procedure

Before performing the turn-off procedures, issue WRITELOG and HALT commands (if using operating system). If manual light is not turned on, press STOP; manual light turns on. Perform "Two-Channel Switch Procedures" if applicable.

1. Check all tape units. Put them in unload state by pressing RESET and LOAD REWIND. After REWIND is completed, press UNLOAD on each tape unit and press RESET to shut power window.
2. Check all disk drives. Put them in unload state by switching to STOP on each disk drive if drives are running. (Disk drives must be individually turned off before power is turned off.)
3. Press POWER OFF. Power is sequenced down automatically. The power-on light turns off.
4. Continue power-off procedures for peripheral equipment not connected to the power-off sequence.

Manual IPL

Manual IPL is performed after a power-on sequence, after malfunctions that necessitate reloading the resident portion of the operating system (control program) into main storage, as part of switching from one operating system to another, or for initial loading of any stand-alone program.

1. Place the program on the desired I/O device and ready that device. (Check that CRT DISPLAY & TAPE OP is at process. Check that test light is off, unless a critical switch has been deliberately set to other than normal position.)
2. Set the three LOAD UNIT switches to the I/O address required.
3. If the installation does not use the secondary nucleus, go to step 4. If the secondary nucleus is used, follow procedure in "Loading the Secondary Nucleus" as direct replacement for step 4.
4. Press LOAD. The load light turns on, the manual light turns off, and system reset occurs. When the loader portion of the program is in main storage, the load light turns off and control of the system is passed to the channel, which directs the storage of the remainder of the program.
5. If this is a stand-alone program (independent utility: DASDI, DUMP/RESTORE, or RECOVER/REPLACE), and it is loaded properly, the wait light turns on. The IC reads FFCO. Type, for example, INPUT=2400 181 (where 2400 is the magnetic tape device type, and 181 is its hex address). Hold down ALTN CODE key and press numeric 5 key. When the job is completed, the program prints out END OF JOB and enters the wait state.

Loading the Secondary Nucleus (OS)

This procedure replaces step 4 of "Manual IPL" where the installation uses the secondary nucleus instead of the primary nucleus.

1. Press STOP; manual light turns on.
2. Set ADDRESS switches to location hex 80
3. Set ADDRESS COMPARE to INSN SOFT STOP.
4. Press LOAD; load light turns on, the manual light turns off, and system reset occurs. When the loader portion of the program is in main storage, the load light turns off and the manual light turns on.
5. Perform steps 1-4 of "Display Main Storage" at location hex 000008.
6. Enter the data (2 hex digits) in the appropriate CXR/CBR (data) switches. The two hex digits may range from F1 to F9. (Last hex digit determined by last character of nucleus name.)
7. Press STORE.
8. Return ADDRESS COMPARE switch to normal setting (PROCESS).
9. Press START. (The secondary nucleus has been loaded.)

To Alter/Display General Registers, Floating-Point Registers, and Main Storage

Alter/Display Chart

Position of CRT DISPLAY & TAPE OP	Position of STOR/DISPLAY/ STG SELECT	Operator Action	Area Displayed/ Stored
PROC		Stop CPU	CPU regs on CRT
	GEN REGS	Set ADDRESS switches 20-23. Press SET CAR. Place CBR/CXR switch to CBR position. Press FTH into CBR (panel M). To alter, set new data in the appropriate CXR/ CBR switches. Press STORE (panel M).	Gen reg specified: data in lights 0-31 of CXR/CBR. Data in switches 0-31 of CXR/CBR.
FLP REGS		Stop CPU	FLP regs on CRT
	FLP REG	Set ADDRESS switches 21-22. Press SET CAR. Press FTH into CBR. Press STORE.	FLP reg specified: data in lights 0-63 of CBR.
STORAGE	MAIN STORAGE	Set ADDRESS switches to desired storage address. Press SET CAR (panel M). Place CBR/CXR switch to CXR/CBR position. Press SCAN (panel N).	16 doublewords of main storage starting at address set in CAR will be displayed on CRT.
	MAIN STORAGE	Set ADDRESS switches to desired storage address. Press SET CAR. Place CBR/CXR switch to CBR position. Press FTH into CBR. To alter, set new data in the appropriate CXR/ CBR switches. Press STORE (panel M).	Doubleword of main storage at address specified in CAR. Data in switches 0-63 of CXR/CBR.

To Display Current PSW

1. Press STOP; manual light turns on.
2. Set CRT DISPLAY & TAPE OP to PROCESS.
3. Read current PSW (bits 0-63) displayed on panel H.
4. Press START to resume processing.

To Alter Current PSW

1. Display current PSW.
2. Place CBR/CXR switch to the CBR position.
3. Set new information in the CXR/CBR (data) switches.
4. Press SET PSW. The current PSW is now altered; the now-current PSW data is automatically displayed on panel H.
5. Press START to resume instruction processing.

To Stop on Main Storage Address

1. Press STOP; manual light turns on.
2. Set ADDRESS COMPARE to (a) INSN SOFT STOP, (b) SCU STORAGE SOFT STOP, or (c) CHAN S/F SOFT STOP.
3. Set ADDRESS/ADDRESS COMPARE to the desired stop address.
4. Press START to resume processing. After the compare stop has been accomplished, restore switches to their normal settings, then press START.

To Clear Main Storage Only

Under normal operating-system operation, it is unnecessary to clear main storage because the operating system provides this function as required. For certain testing operations, however, it may be desirable to clear main storage. The following procedure clears main storage, but does not alter the contents of general or floating-point registers.

1. Press STOP; manual light turns on.
2. Set STORE/DISPLAY/STG SELECT to MAIN STORAGE.
3. Set CRT DISPLAY & TAPE OP to STORAGE.
4. Set all CXR/CBR switches to 0 or press CBR TO ZEROS.
5. Set (lever) STORAGE TEST to STO (up position) on panel L.
6. Press START STORAGE TEST on panel L.
7. Restore STORAGE TEST to normal, center position. All of main storage now contains data (zeros) in CXR/CBR switches.
8. To resume processing, re-IPL the control program.

To Clear System

1. Hold System Clear Enable switch (panel L) in the down position while depressing the System Reset switch. This will cause (1) a normal system reset, (2) all of main storage, GRS and FLRS, and Storage Protect keys to be reset to zero, and (3) the data buffers to be invalidated.
2. Hold System Clear Enable switch in the down position while depressing the Load switch. This will cause the machine to execute a normal system clear and then the normal load function.

Hardstop Option

If both wait and system lights are off, possible hardstop may be assumed. The hardstop procedure should be used only at the recommendation of the serviceman.

1. Set MACH CHECK STOP to HARD STOP and leave in this position; the test light remains on. The CPU hard stops on each machine check.
2. At stop time, record all check lights that are turned on; save information for the service personnel.
3. Perform storage error analysis.
4. If analysis shows main storage failure, perform procedure in "Storage Failure." At the completion of storage reconfiguration, notify the service personnel.
   a. Press SYSTEM RESET.
   b. Restore MACH CHECK STOP to center (normal) position.
   c. Perform manual IPL of control program; continue processing.
5. If analysis shows buffer failure, perform procedure in "Buffer Failure." At the completion of buffer failure procedure, notify the service personnel.
   a. Press CPU RESET.
   b. Set MACH CHECK STOP to PROCESS.
   c. Press FORCE MACH CHK.
   d. Set MACH CHECK STOP to HARD STOP.
   e. Press START to resume processing in hardstop option.
6. If analysis shows neither main storage nor buffer storage has failed.
   a. Set MACH CHECK STOP to PROCESS.
   b. Press START.
   c. Set MACH CHECK STOP to HARDSTOP.

NOTE: See Source SRL for description of "Storage Failure" and "Buffer Failure" procedures.

Section 4 Contents

DOS/VS IPL Commands

Source: SY33-8571 DOS/VS Handbook, Release 29

Operation	Operand	Remarks
ADD	X'cuu'[(k)],devicetype[,X'ss' | ,X'ssss' | ,X'ssssss']	Add a device to the PUB table. X'cuu': Channel and unit number (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)-(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 device type: actual device (See device codes list) X'ss' X'ssss' X'ssssss': device specification (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 X'ss' is required for MICR/OCR device types. It specifies the external interrupt bit in the old PSW, which is used by this device to indicate "read complete" The specifications are: 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

Operation	Operand	Remarks
ADD (Cont'd)		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. These specifications are: X'00' -No error correction feature X'01' Error correction feature For the ICA of the M 115/125, X'ss' X'ssss' or X'ssssss' is used to specify the line mode setting for a Start/Stop line or a BSC line. This 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. Note: Optional statement; if required it must be entered before SET command
CAT	UNIT= X'cuu'	Assigns the system logical unit SYSCAT X'cuu': Indicates the hexadecimal channel (c) and unit (uu) number of the device that is to contain the VSAM catalog. SYSCAT may only be assigned to the following DASD types: 2314/2319 and 3330/3333. Note: Optional statement; if required the CAT command must follow the SET command and precede the DPD com'd.
DEL	X'cuu'	Delete a device from the PUB table. X'cuu': Channel and unit number. Note: Optional statement; if required it must be entered before SET command
DPD	[TYPE= {N / F}][, UNIT= X'cuu', CYL= xxx][, VOLID= xxxxxx]	Defines the page data set. 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.

Operation	Operand	Remarks
DPD (Cont'd)		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= X'cuu' specifies the channel and unit number of the device that is to contain the page data set. If UNIT is specified, CYL must also be specified. CYL= xxx: Specifies the sequential number of the cylinder, relative to zero, where the page data set is to begin. (The size of the page data set extent is calculated by the system) If CYL is specified, UNIT must also be specified. VOLID= xxxxxx identifies the alphanumeric volume serial no 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. Notes: Required statement. The DPD command must be the last command entered during IPL procedures. The operands of the DPD command may be given in any order.
SET	[DATE= value1 [, CLOCK=value2]] [, ZONE= {EAST / WEST} /hh/mm]	value1: In one of the following formats: mm/dd/yy or dd/mm/yy, mm: month (01-12) dd : day (01-31) yy : year (00-99) value2: In the following format: hh/mm/ss, hh : hours (00-23) mm: minutes(00-59) ss : seconds(00-59) EAST: Specifies a geographical position east of Greenwich.

DOS/VS IPL Commands (cont'd)

Operation	Operand	Remarks
SET (Cont'd)		WEST: Specifies a geographical position west of Greenwich. hh/mm: A decimal value which indicates the difference in hours and minutes between local and Greenwich Mean Time. hh : 0-12 mm: 0-59 Note: Required statement. If any ADD or DEL commands are required, they must precede the SET command.

Name	Operation	Operand	Remarks	Accepted by
	ALLOC	F1=nK [,F2=nK] [,F3=nK] [,F4=nK]	Allocates foreground program areas in the virtual address area. Value of n is an even number. The order of operands is arbitrary. At least one operand must be specified.	JCC AR
	ALLOCR	[BGR=nK] [,F1R=nK] [,F2R=nK] [,F3R=nK] [,F4R=nK]	Allocates real address area among foreground and background programs. Value of n is an even number. The order of operands is arbitrary. At least one operand must be specified.	JCC
	ALTER	XXXXXX	Alters 1 to 16 bytes of virtual storage. XXXXXX is the hex address where alteration is to start.	AR
[//]	ASSGN	For any device: SYSxxx, { UA / IGN } [,TEMP / ,PERM]	For remarks see end of this statement	JCS JCC
		For disks: SYSxxx, { X'cuu' / (address-list) / SYSyyy / DISK / 2311 / 3330 / 2314 / 3340 } [,TEMP / ,PERM] [, VOL=volserno][, SHR]		
		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' / ,ALT] [,TEMP / ,PERM] [,VOL=volserno]		

Name	Operation	Operand	Remarks	Accepted by
	ASSGN (Cont'd)	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]	For remarks see end of this statement	

Name	Operation	Operand	Remarks	Accepted by
	ASSGN (Cont'd)	SYSxxx :	can be SYSRDR, SYSIPT, SYSIN, SYSPCH, SYSLST, SYSOUT, SYSLOG, SYSLNK, SYSREC, SYSRLB, SYSSLB, SYSCLB (JCC only,), or SYS000-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, 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':	density (magn. tape only)	

ss	BPI	Parity	Transl. feat	Conv. feat
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	800	single dens 9 tr.		
C0	1600	single dens. 9 tr.		
C0	1600	dual dens. 9 tr.		
C8	800	dual dens. 9 tr.		
D0	6250	single dens. 9 tr.		
D0	6250	dual dens. 9 tr.		

Name	Operation	Operand	Remarks	Accepted by
	ASSGN (Cont'd)	ALT:	specifies alternate tape unit. (Invalid for SYSIPT)	
		H1:	specifies input hopper 1 for input on 2560 or 5425; is assumed if neither H1 nor H2 is specified.	
		H2:	specifies input hopper 2 for input on 2560 or 5425; (invalid for programmers units)	
		PERM:	the assignment is permanent	
		TEMP:	the assignment is temporary	
		VOL=volserno :	volume serial number of the tape or disk required.	
		SHR:	indicates the shared option for disk devices	
	BATCH	{BG / Fn} where n= 1,2,3 or 4	Start or continue processers	AR
	CANCEL	{BG / Fn} where n=1,2,3 or 4	Cancels execution of current job in specified area	AR
	CANCEL	blank	Cancels execution of current job	JCC
[//]	CLOSE	SYSxxx [,X'cuu' [,X'ss'] / ,UA / ,IGN / ,ALT]	SYSxxx : for magnetic tape SYSPCH SYSLST SYSOUT SYS000-SYSnnn • for DASD (JCC only) SYSIN SYSRDR SYSIPT SYSPCH SYSLST X'cuu', X'ss', UA, IGN, ALT: Values as described in ASSGN command.	JCS JCC

Name	Operation	Operand	Remarks	Accepted by
//	DATE	mm/dd/yy or dd/mm/yy	mm : month (01-12) dd : day (01-31) yy : year (00-99)	JCS
//	DLAB	'label fields 1-3' C xxxx,yyddd,yyddd,	'label fields 1-3': first three fields of Format 1 DASD file label. Is a 51-byte character string, contained within apostrophes and following 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 nonblanc character in column 72. xxxx: Volume sequence number (4-digit num.) Must begin in column 16 of the continuation statement. Columns 1-15 are blank. yyddd, File creation date follow- yyddd: ed 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.	JCS
//	DLBL	filename, ['file-ID'], [date], [codes], [date 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) codes: Two to four alphabetic characters (SD, DA, DU, ISC, ISE, VSAM) data secu- One to three charac- rity: ters.	JCS

Name	Operation	Operand	Remarks	Accepted by
	DSPLY	XXXXXX	Displays 16 bytes of virtual storage	AR
	DUMP	blank S BG Fn BGS FnS PDAREA address, address where n=1,2,3 or 4 [BG] [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 progr. and associated registers BGS, FnS: Applicable real or virtual partition currently occupied, registers and supervisor area PDAREA: PD table, PD area and AAA address, address: Specified storage area between the two hexadecimal addresses and associated registers	AR
	DVCDN	X'cuu'	X'cuu': c= 0-6 uu= 00-FE(0-254) in hex	JCC
	DVCUP	X'cuu'	X'cuu': c= 0-6 uu= 00-FE(0-254) in hex	JCC
	END or ENTER	blank	End of SYSLOG communications END for the 3210 and 3215 printer keyboards ENTER for DOC	JCC AR
	ENDSD	blank	Terminates execution of SD aids program	AR

Name	Operation	Operand	Remarks	Accepted by
[//]	EXEC	{ [[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 nK, AUTO, or (AUTO,nK) 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, the first of which must be alphabetic. OV: Indicates that overwrite statements follow EXEC statement	JCC
//	EXTENT	[symbolic unit], [serial number], [type], [sequence number], [relative track], [number of tracks], [split cylinder track], [B=bins]	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	JCS
	IGNORE	blank	Ignore abnormal condition	AR JCC

DOS/VS Job Control and Attention Routine Commands (cont'd)

Name	Operation	Operand	Remarks	Accepted by
//	JOB	jobname [accounting information]	jobname : One to eight alphameric characters accounting information : One to sixteen characters	JCS
//	LBLTYP	{ TAPE [(nn)] / NSD (nn) }	TAPE: Used when tape files requiring label information, are to be processed and no non-sequential 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 proces'd (nn): Largest number of extents per single file	JCS
[//]	LISTIO	{ SYS / PROG / Fn / ALL / SYSxxx / UNITS / DOWN / UA / X'cuu' } where n=1,2,3 or 4	Causes listing of I/O assignments on SYSLST for JCS and SYSLOG for JCC	JCS JCC
	LOG	blank	Causes logging of job control statements on SYSLOG	JCC AR
	MAP	blank	Causes a map of area in real and virtual storage to appear on SYSLOG	JCC AR
	MODE	{ IR / CR / CE, cuu [, I [,xx,y]] [, D [,xx,y]] [, N] / R / STATS / HIR / ECC [, { M / C }] { [[, { R / Q / TH }] [, E= eeee] [,T= tttt]] } }		AR

Name	Operation	Operand	Remarks	Accepted by
	MODE (Cont'd)		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 within these braces must be selected. TH is only valid for the Model 145 when ECC, C is specified with the MODE command	
	MSG	{Fn} where n= 1,2,3 or 4	Transfers control to message routine	AR
1 // 1	MTC	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=00-FE (in hex) nn: dec. number (01-99)	JCS JCC
	NEWVOL	[BG / Fn]	Indicates that a new volume has been mounted for the specified partition	AR
	NOLOG	blank	Suppresses logging of job control statements on SYSLOG	JCC AR
//	OPTION	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 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	JCS

Name	Operation	Operand	Remarks		Accepted by
	OPTION (Cont'd)		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 crossreference 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 attemp to assign device is unsuccessful	
			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.	

Name	Operation	Operand	Remarks	Accepted by
	OPTION (Cont'd)		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= Specifies a value for assembler system variable symbol and SYSPARM	
[//]	OVEND	[comments]	Indicates end of overwrite statements for a cataloged procedure	JCS JCC
[//]	PAUSE	[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.	JCS JCC
	PAUSE	[{BG / Fn} [,EOJ]] where n= 1, 2, 3 or 4	Causes pause at end of current job step or at end of job	AR
	PRTY	[P1, P2[, P3[, P4[, P5]]]]	Pn= BG, F1, F2, F3 or F4. Allows the operator to display or change the priority of partitions	AR
[//]	RESET	{SYS / PROG / ALL / SYSxxx}	Resets I/O device assignments	JCS JCC
	ROD	blank	Causes all SDR counters for all non-teleprocessing devices on the recorder file on SYSREC to be updated from the SDR counters in main storage	JCC
//	RSTRT	SYSxxx, nnnn[, filename]	SYSxxx: Symbolic unit name of the device on which the checkpoint records are stored. Can be SYS000-SYSnnn nnn: four character identification of the checkpoint record to be used for restart filename: symbolic name of the DASD file to be used for restarting	JCS
	SET	[, UPSI=value1] [, LINECT=value2] [, RCLST=value3] [, RCPCH=value4] [, RF=value5] [, DATE=value6] [, HC=value7]	value1: 0, 1 or X value2: standard number of lines for output on each page of SYSLST value3: decimal number indicating minimum number of SYSLST disk records remaining to be written before operator warning	JCC

Name	Operation	Operand	Remarks	Accepted by
	SET (Cont'd)	[,SVA=value 8] [,SPL=value 9]	value 4: decimal number indicating mimimum number of SYSPCH disk records remaining to be written before operator warning value 5: defines to the system the status of the recorder file (IJSYSREC) on SYSREC used by the RMSR feature RF={YES (file exists) / CREATE (create file)} value 6: in one of the following formats: mm/dd/yy or dd/mm/yy mm : month (01-12) dd : day (01-31) yy : year (00-99) value 7: HC={YES / NO / CREATE} YES: hard-copy file exists NO: No recording performed CREATE: Create a hard-copy file value 8: storage size in the format nK, nK for SVA and GETVIS area, respectively value 9: specify CREATE to have the system directory list (SDL) built in the SVA.	
	START	{BG / Fn} where n=1,2,3 or 4	Same as BATCH	AR
	STOP	blank	Stops batched-job progr. processing	JCC
//	TLBL	filename, ['file-ID'], [date], [file serial number], [volume sequence number], [file sequence number], [generation number], [version number]	filename : One to seven alphameric characters, the first of which must be alphabetic 'file-ID': One to seventeen alphameric characters date: One to six characters (yy/ddd or d-dddd)	JCS

Name	Operation	Operand	Remarks	Accepted by
	TLBL (Cont'd)	Note : For ASCII file processing the fourth and fifth operands are called set identifier and file section number, respectively	[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	'label fields 3-10'	'label fields 3-10' : Indicated fields of the standard tape file label for either EBCDIC or ASCII. A 49-byte character string, contained within apostrophes	JCS
//	TPLAB	'label fields 3-10 C label fields 11-13'	'label fields 3-10' : same as above C : Any nonblanc character in column 72 label fields 11-13' : 20 character direct continuation of the same character string begun with fields 3-10 (no blanks, apostrophes or commas separating)	JCS
	UCS	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 CU. SYSxxx must be assigned to a 1403 or 5203 Printer with the UCS feature.	JCC
	UNBATCH	blank	Terminates foreground processing	JCC
//	UPSI	nnnnnnnn	n : 0, 1 or X	JCS
//	VOL	SYSxxx, filename	SYSxxx: Can be SYS000-SYSnnn filename: One to seven alphameric characters, the first of which must be alphabetic	JCS

Name	Operation	Operand	Remarks	Accepted by
//	XTENT	type, sequence, lower, upper, 'serial no.', SYSxxx [,B2]	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 0-255 lower: Lower limit of extent in the form $B_1C_1C_1C_2C_2C_2H_1H_2H_2$ 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 2321 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 track 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: Can be SYS000-SYSnnn B2 : 0 for 2311 or 2314/2319; 0-9 for 2321	JCS

Name	Operation	Operand	Remarks	Accepted by
//	ZONE	{EAST / WEST} /hh/mm	EAST: A geographical position east of Greenwich WEST: A geographical position west of Greenwich hh/mm: A decimal value which indicates 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	JCS
/+	ignored	[comments]	Indicates end of procedure	JCS
/*	ignored	ignored	Columns 1 and 2 are the only columns checked	JCS
/&	ignored	[comments]	Columns 1 and 2 are the only columns checked. Comments appear on SYSLOG and SYSLST at EOJ	
*		comments	Column 2 must be blank	

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.

DOS/VS POWER Commands

Task Management Console Operator Commands

Source: SY33-8571 DOS/VS Handbook, Release 29

Operation	Operand		Comments
S	[xx]RDR,[cuu][,b]	START	Reader task
S	[xx]RDR,[cuu][,b],['filename'],[vols],[S]		Reader task for diskette
S	[xx]RDR,cuu,[b],cuu		Reader task for reader/diskette
S	[xx]PRT,[cuu][,b]		Printer task
S	[xx]PUN,[cuu][,bp]		Punch task
S	[xx]PUN,[cuu],[b],RESTART		Punch task from checkpoint
S	[xx][PRT / PUN],[cuu],[b / bp],[ttt / zzzz]		Tape writer Class writer
S	RJE,cuu,[2770 / 2780 / 3780]		RJE task
S	RJE,cuu,[2770 / 2780 / 3780],2540,cuu		RJE simulator task
P	[xx]yyy,[cuu],[EOJ / CHECKPOINT]	STOP	Reader/writer task
P	cuu,[EOJ / CHECKPOINT]		
P	RJE,cuu		RJE task
G	[xx]yyy[,cuu]	REACTIVATE	Reader/writer task
G	cuu		
G	xx		Batch partition
G	RJE,cuu		RJE task
C	[xx]yyy[,cuu]	CANCEL	A reader/writer task
C	cuu		
F	[xx][PRT / PUN],[cuu][,ALL]	FLUSH	A writer task
F	cuu[,ALL]		
M	[xx]PRT / PUN,[cuu][,nn]	DISPLAY/ ALTER	Copy counter nn= additional copy value (1 to 99)
M	cuu[,count]		
T	[xx]PRT,[cuu][,count]	RESTART	Print write task count=[+1 to +999 / -1 to -999 / 1 to 999] P S
T	cuu[,count]		
E	(no-operand)	END	POWER system partition
E	KILL	CANCEL	With DUMP

Note: Omission of [xx] denotes partition independent reader/writer task

Note: xx = BG or Fn
yyy = RDR, PRT or PUN
cuu = Unit record or tape physical device address
zzzz= Class(es) to be assigned to a writer task (one to four alphabetic)
z = Job output Class (A through Z)
n = Priority 0 through 9
ttt = Tape address (cuu)

DOS/VS POWER Commands (cont'd)
Queue Management Console Operator Commands

Operation	Operand	Comments
A	xxyyy,jname,[jnr],priority-n	ALTER job priority in a specified queue to priority n (n=0-9)
D	xxyyy,{jname[,jnr] ALL HOLD FREE Pn RJE LOCAL CLASSz}	DISPLAY job status in a specified queue of a specific job All jobs all jobs in hold status all jobs not in hold status all jobs with priority n(n=0-9) all RJE jobs all local jobs all jobs with class z (z=A-Z)
D	A	active reader,writer and RJE tasks
D	B	available program and data buffers
D	Q	free JCT records and track groups
D	T	system time and date
H	xxyyy,{jname[,jnr] ALL Pn}	HOLD in the specified queue a specific job ALL jobs all jobs with priority n (n=0-9)
L	xxyyy,{jname[,jnr] ALL}	DELETE from the specified queue a specific job ALL jobs
R	xxyyy,{jname[,jnr] ALL Pn}	RELEASE from the specified queue a specific job ALL jobs all jobs with priority n (n=0-9)
J	cuu	JOB only valid if ACCT=YES generated punch ACCTFIL records to card unit cuu and delete ACCTFIL
J	ttt	write ACCTFIL records to tape unit ttt and delete ACCTFIL
J	DEL	delete ACCTFIL
Z	DUMP,[TIB,QFL,DFL]	Monitor option
Z	TRACE,[SVC,TSK]	Trace option
Z	{DUMP TRACE},LST	Liat trace option
Z	{DUMP TRACE},END	Terminate trace option

Note: xx = BG or Fn
yyy = RDR, PRT or PUN
cuu = Unit record or tape physical device address
z = Job output Class (A through Z)
n = Priority (0 through 9)

Operation	Operand	Comments
B	M, {termid / userid / ALLUSERS}, 'msg'	BROADCAST Send a message to a specific user or to all terminal users (ALLUSERS)
B	L, {termid[,nr] / userid[,nr] / ALLUSERS[,nr] / ALL}	Delete message(s) for a specific user or all messages (nr= 1-99)
B	D, {termid[,nr] / userid[,nr] / ALLUSERS[,nr]}	Display message(s) for a specific terminal user or ALLUSERS (nr= 1-99)
I	U,userid	INQUIRE about RJE task status for a specific userid
I	T,termid	a specific termid
I	L,cuu	a specific line
I	ALL	ALL valid terminal designations
O	jname,I jnr I, {termid / userid / ALLUSERS / LOCAL} [,PRT / ,PUN]	CHANGE OUTPUT destination of a job to a specific user, to a local output device or to all terminal users on a read only basis (ALLUSERS)

FORMAT OF Q's [,AUTOSTART] ?

Explanation: Issued during partition initialization and is in two parts:
1) Format Q's - format queues or warm start
2) Autostart - (only is specified as a generation option) whether the reader/writer devices should be automatically initiated or not

Operator response: [Q,][D,][A,][YES / NO] (EOB) where

1) Response to format Q's is
Q- format of QFILE records.
D- format DATAFIL and QFILE records
A - format ACCTFIL records
These parameters may be specified in any order. If none of the above is specified, no formatting occurs

2) Autostart is specified as:
YES - Initiate reader/writer devices. Default is omitted
NO - Do not initiate reader/writer devices

Inquire comm'd specifi-cation	Work station states in response to inquire command								
	work station states						report items included		
	not attached	not supported	not initiated	inactive	active	processing	line address	termid	userid
line address		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 Inquire command creates a report for each RJE Block Name List Entry in accordance with the line address specification above.

POWER Commands (cont'd)
RJE Workstation Commands

ID	Operation	Operand	Comments
*..	RJSTART	termid, [BRDCST], [termtype], [bufsize], [nopunch]	Attach a workstation
*..	RJEND	(no operand)	Detach a workstation
*..	LOGON	userid	Begin a user session
*..	LOGOFF	(no operand)	Terminate a user session
*..	OUTPUT	[jname[,jnr] ALL ALLUSERS]	Request a specific job output ALL output for userid All output for ALLUSERS
*..	CONTINUE	[BEGIN NO HOLD LOCAL PAGE[,count]]	Request discontinued output from beginning Delete output for the job Hold output for the job Change destination to local writer Page forward or backward printed output; Count={+1 to +999 / -1 to -999 / 1 to 999} pages
*..	CONTINUE	(no operand)	Resume with interrupted data block
*..	DELETE	xxyyy,{jname[,jnr] ALL}	Delete from the specified queue a specific job ALL jobs
*..	STATUS	xxyyy,[jname[,jnr] HOLD Pn ALLUSERS ALL]	Display job status in the specified queue of a specific job ALL jobs All jobs in hold status All jobs with priority n (n=0-9)
*..	BRDCSTR	(no operand)	Request broadcast messages
*..	MSGR	M,'text'	Send message to console operator

VS1 Operator Command Outlines (VS1 Release 3)

Source: GC24-5091-3 OS/VS1 Programmer's Reference Digest

Operation	Operand
{CANCEL / C}	{[JBN=| jobname* [,DUMP[,ALL]] [,IN[=i / =HOLD]] | ,OUT[=s / =HOLD]] | ,USER=userid| / [DEV=| unitaddr* / devicetype* / [procname,| identifier*} * May be specified up to five times if separated by commas and enclosed in parentheses. Can be combined with the other parameters that are allowed to be specified up to five times.
{DEFINE / N}	[LIST / PARM=membername]
{DISPLAY / D}	{T / A / U [,TP / ,GRAPHIC / ,TAPE / ,DASD / ,UR] [,ONLINE / ,OFFLINE] [,cuu[,nnn]] / R [,USER=userid / ,ALL] / RT {ALL[,L] / ACT[,L] / INACT[,L] / TERM=termid[,device]} / {N}{[=qclass|[,USER=userid]} {Q}{[,ALLQ] / jobname*[,HOLD] / CONSOLES / P,{IN=class / IN='string[,string...]'[,ALL] / OUT=class / OUT='string[,string...]'[,ALL]} / SQA / USER[,L / ,=userid]} * May be specified up to five times if separated by commas and enclosed in parentheses.
DUMP	[text]
{HALT / Z}	EOD
{HOLD / H}	{{ALL / IN[=inclass] / Q [=inclass] / OUT[=outclass]} [,JBN] / jobname*[,OUT[=outclass[outclass...]]] [,USER=userid]} * May be specified up to five times if separated by commas and enclosed in parentheses.
{LISTBC / LB}	[NOTICES][,MAIL[=userid]] [MAIL][=userid][,NOTICES]
{LOG / L}	'text'
LOGOFF	[userid]

VS1 Operator Command Outlines (cont'd)

Operation	Operand
LOGON	userid[,/password][TERM (termid)] [PROC (procname)] [NOTICES / NONOTICES] [MAIL / NOMAIL]
MODE	STATUS RETRY,{RECORD / QUIET} MAIN,{RECORD / QUIET} CONTROL,{THRESHOLD / QUIET} Note: Blanks may be used in place of the commas in this command.
{MODIFY / F}	{procname[.]{identifier / Pnn} / unitaddr} [,TYPRUN={HOLD / NOHOLD}] [,CLASS=outclass] [,CLASS=jobclass] [,START={ALL / n,...}] [,STOP={ALL / n,...}] [,RESTART={ALL / n,...}] [,'text'] [,PAUSE={FORMS / DATASET}] [,JOBCLASS=jobclass] [,OUTCLASS=s]
{MONITOR / MN}	DSNAME[,T] SPACE STATUS A SESS[,T]
{MOUNT / M}	unitaddr,VOL={(NL,volserial) / (SL,volserial) / (AL,volserial)}[,USE={STORAGE / PUBLIC / PRIVATE}]
{MSGRT / MR}	{(D=(display-operand,...)[,MN=A[,K])} / REF} .
{PAGETUNE / PT}	DISPLAY[=(([STOP] [PAGEMEAS] [REACT] [STATUS])]
{PAGETUNE / PT}	STOP=[({level / SYS})] PAGEMEAS={(([ALL= / In=]frequency[,In=frequency]...)) / frequency / (frequency) / SYS / (SYS)} REACT={(([ALL= / In=]{time / (time[,pagetran]) / (,pagetran)})[,In={time / (time[,pagetran]) / (,pagetran)}]...) / time / (time[,pagetran]) / (,pagetran) / SYS / (SYS)}

VS1 Operator Command Outlines (cont'd)

Operation	Operand
{RELEASE / A}	{ALL / IN[=inclass] / Q[=inclass] / OUT[=outclass]}[,JBN] jobname *[,OUT[=outclass|outclass...]][,USER=userid] * May be specified up to five times if separated by commas and enclosed in parentheses.
{REPLY / R}	{R} id,{'text' / text}
{RESET / E}	jobname *,{PRTY=nn / CLASS=c} * May be specified up to five times if separated by commas and enclosed in parentheses.
{ROUTE / RO}	[JBN=jobname / ALL][,GROUP=(class[,class...])] [,USER=userid][,CLASS=class] [,DEST=userid][,HOLD={YES / NO}]
{SEND / SE}	'text'[,ALL / ,USER=(userid[,userid...]) / ,OPERATOR=routecode][,NOW / ,LOGON / ,SAVE] message no.[,LIST / ,DELETE]
{SET / T}	DATE=yy.ddd|CLOCK=hh.mm.ss[,]
{START / S}	procname[.{Pnn / ALL / .iaentifier}][,[unitaddr / ,devicetype][,volserial]] [,jobname ,outclass ,jobclass ,(JOBCLASS=class, OUTCLASS=s) ,(parm) ,([mode={INT / (INT,S) / EXT}],TIME=YES|,DEBUG=YES|,BUF=nnn) [,{SCRT / RLSE[,ID=x] / KEEP}] [,USER=userid] [,keyword=option,...]]* * The keyword=optional parameter(s) can follow after the last positional parameter. May be replaced by: ,PARM='SWA=nnnn,RESV=nn'.
{STOP / P}	{procname[.{Pnn / .iaentifier}]*[,USER=userid] / unitaddr* / jobname* / JOBNAMES / DSNAME / SPACE / STATUS} * May be specified up to five times if separated by commas and enclosed in parentheses. Can be combined with the other parameters that are allowed to be specified up to five times.

VS1 Operator Command Outlines (cont'd)

Operation	Operand
{STOPMN / PM}	{JOBNAMES / DSNAME / SPACE / STATUS / A / SESS}
{SWAP / G}	{OFF / ON / unitaddr,cuu}
{SWITCH / I}	SMF
{UNLOAD / U}	unitaddr
{VARY / V}	{unitaddr / (unitaddr,unitaddr...)} {,ONLINE / ,OFFLINE / ,PATH,cuu,{ONLINE / OFFLINE}}
{VARY / V}	{unitaddr / (1-cuu,O-cuu)},MSTCONS
{VARY / V}	{unitaddr / SYSLOG},HARDCPY [,CMDS / ,NOCMDS / ,OFF / ,INCMDS / ,STCMDS] [,ROUT={ALL / NONE / (routecode[,routecode]...)}]
{VARY / V}	({unitaddr / O-cuu / (1-cuu,O-cuu)} [,unitaddr / ,O-cuu / ,(1-cuu,O-cuu)]...) {,ONLINE / ,OFFLINE / ,CONSOLE [,AUTH={ALL / INFO / ([SYS][,IO][,CONS])}] [,ROUT={ALL / NONE / (routecode[,routecode]...)}] [,ALTCONS={unitaddr / O-cuu / (1-cuu,O-cuu)}]}
{WRITELOG / W}	{s / CLOSE}
{WRITER / WTR}	unitaddr,{FSP={nnn / DS} / BSP={nnn / DS / JOB} / LSP={n / C} / HOLD / REPEAT={(nnn,JOB) / nnn}} [,JBN=jobname][,USER=userid]

Definitions of Substitutional Operands

c	one input (A-Z, 0-9) or output (A-Z, 0-9) class.
class	one to fifteen job classes (A-Z, 0-9) without priorities.
cuu	the channel and unit address (cuu) on an I/O device.
device	symbolic remote device address used at RES workstation.
devicetype	a unit type, such as 2540 or 1403, of the output device to be used.
eeee	a four digit decimal number indicating an error count.
frequency	the number (0-9) of task dispatchings occurring before invocation of the page measurement routine.
hh.mm.ss	hour (00-23), minute (00-59), and second (00-59).
i	a single input class.
id	a two digit identifier that is identical to the identifier included in the system message.
identifier	a unique one to eight character alphanumeric name that starts with a letter and identifies one task started by a cataloged procedure.
inclass	one to four input queue classes (A-Z, 0-9).
I-cuu, O-cuu	the channel and unit addresses (cuu) of the input (I-cuu) and output (O-cuu) devices that make up a composite console.
jobclass	one to fifteen job classes (A-Z, 0-9). Priority of processing is from left to right.
jobname	the name of a specific problem program that appears on the JOB statement.
keyword=option	any valid keyword/option combination that may appear on a DD statement.
level	the in-use qu position (1-9 or N) on the STOP line.
n	a single digit decimal number.
nnn	a one to three digit decimal number.
outclass	one to eight output classes (A-Z, 0-9).
O-cuu	the channel and unit address (cuu) of an output only console.
pagetran	a number (0-255) of page transmission operations (page-ins and page-outs).
parm	information, of variable format, to be passed to a problem program.
Pnn	a partition number (P00-P15).
procname	the name of a cataloged procedure that resides on SYS1.PROCLIB.
qclass	one to four queue classes (A-Z, 0-9 for input queues, SOUT for the output queue, HOLD for the hold queue).
routecode	a system-to-operator message routing code.
s	a single output class (A-Z, 0-9).
text	information of extremely variable format.
time	a real time interval in seconds (0-9).
tttt	a four digit decimal number indicating an hour limit.
unitaddr	the channel and unit address (cuu) of an I/O device.
volserial	the volume serial number of a disk pack or magnetic tape.
x	a recording mode: either R (record) or Q (quiet).
yy.ddd	the year (00-99) and Julian day (000-366).

VS1 Message Routing Codes

Source: SR20-7091 OSVS1 Basic Operations - Illustrations

System Code	Definition
1	Master console action (01F)
2	Master console information
3	Tape area (01C)
4	DASD area (009)
5	Tape library
6	DASD library
7	Unit Record Area (01D)
8	Teleprocessing equipment status
9	System Security
10	System Error Maintenance
11	Sysout device

VS2 (JES2) Message Routing Codes

Source: GC38-0210-1 Operator's Reference

System Code	JESZ Codes	Definition
none	LOG	Hardcopy log
1	MAIN	Master console action
2	MAIN	Master console information
3	TAPE	Tape pool
4	TAPE	Direct access pool
5	TAPE	Tape library
6	TAPE	Disk library
7	UR	Unit record pool
8	TP	Teleprocessing control
9		System security
10	ERROR	System error/maintenance
11		Programmer information
12		Emulators
13		Reserved for customer use
14		Reserved for customer use
15		Reserved for customer use
16		Reserved for future expansion

VS2 Operator Command Outline (Release 1.6)

Source: GC24-5091-2 OS/VS Programmer's Reference Digest

Operation	Operand
{CANCEL / C}	{identifier / devicetype / unitaddr / devicename / jobname [,DUMP] [,ALL] [,IN[=i]] [,OUT[=s]]}
{CONTROL / K}	C,D,idd[,L=cc]
{DISPLAY / D}	{SQA / A / T / U [,TP / ,GRAPHIC / ,TAPE / ,DASD / ,UR] [,OFFLINE / ,ONLINE] [,cuu] [,nnn] / CONSOLES / jobname / R / Q[=qclass] / N[=qclass] / C,K}
DUMP	COMM=(comment)
{HALT / Z}	EOD
{HOLD / H}	{Q[=inclass] / jobname}
{LOG / L}	'text'
MODE	{STATUS / RETRY[,]{RECORD / QUIET} / MAIN[,]{RECORD / QUIET} / CONTROL[,]{THRESHOLD / QUIET}}
{MODIFY / F}	{jobname,parm / [procname.]identifier {,CLASS=jobclass / ,CLASS=outclass / ,PAUSE={FORMS / DATASET}}}
{MONITOR / MN}	{JOBNAMES[,T] / DSNAME / SPACE / STATUS}

VS2 Operator Command Outlines (cont'd)

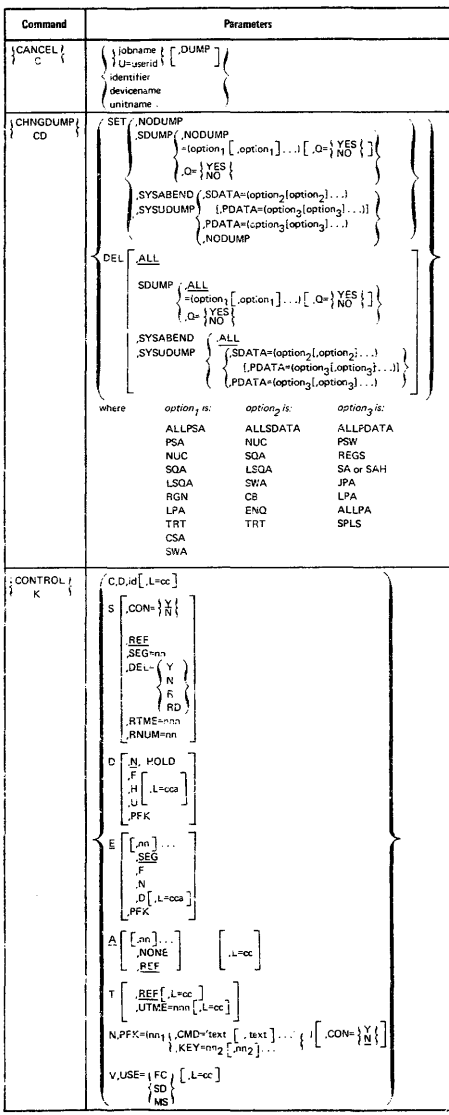
Operation	Operand
{ MOUNT / M }	{ unitaddr / devicename } { ,VOL=(SL,serial) / ,VOL=(AL,serial) / ,VOL=(NL,serial) } [,USE= { STORAGE / PUBLIC / PRIVATE }]
{ MSGRT / MR }	{ D=(display-operand,...) [,L= { a / cc / ccc }] / REF }
{ RELEASE / A }	{ Q[=inclass] / jobname }
{ REPLY / R }	id,['']text[']
{ REPLY / R / (used for DUMP) }	{ U / STOR=(startaddr,endaddr,...)[,SDATA] / SDATA }
{ RESET / E }	jobname { ,PRTY=nn / ,CLASS=c / ,PRTY=nn,CLASS=c } [,OUT=s]
{ SET / T }	DATE=yy.ddd[,CLOCK=hh.mm.ss]
{ START / S }	procname[.identifier] [,cuu] [,volumeserial] [,parmvalue] [,jobname] [,LSQA=nn] [,keyword=option,...]
	{ GTF / GTFSNP } [.identifier) [,[cuu],[volumeserial]]] [,([MODE= { INT / (INT,S) }] [,BUF=nnn] [,TIME= { YES / NO }] [,DEBUG= { YES / NO }])] [,REG=nnn]
{ STOP / P }	{ [procname.]identifier / jobname }
{ STOPMN / PM }	{ JOBNAMES / DSNAME / SPACE / STATUS }
{ SWAP / G }	{ OFF / ON / unitaddr,cuu }
{ SWITCH / I }	SMF
{ UNLOAD / U }	unitaddr
{ VARY / V }	({ unitaddr / O-cuu / (I-cuu,O-cuu) } [{ ,unitaddr / ,O-cuu / ,(I-cuu,O-cuu) }]...)
	,CONSOLE [,AUTH= { ALL / INFO / ([SYS][,IO][,CONS]) }] [,ROUT= { ALL / NONE / (routecode[,routecode]...) }] [,ALTCONS= { unitaddr / O-cuu / (I-cuu,O-cuu) }]

VS2 Operator Command Outlines (cont'd)

Operation	Operand
{VARY / V}	{unitaddr / (unitaddr,unitaddr...)} {,ONLINE / ,OFFLINE / ,PATH,cuu, {ONLINE / OFFLINE}}
{VARY / V}	{unitaddr / (I-cuu,O-cuu)} ,MSTCONS
{VARY / V}	{unitaddr / SYSLOG} ,HARDCPY [,CMDS / ,NOCMDS / ,OFF / ,INCMDS / ,STCMDS]
	[,ROUT={ALL / NONE / (routecode[,routecode]...)}]
{WRITELOG / W}	{s / CLOSE}

Definitions of Substitutional Operands

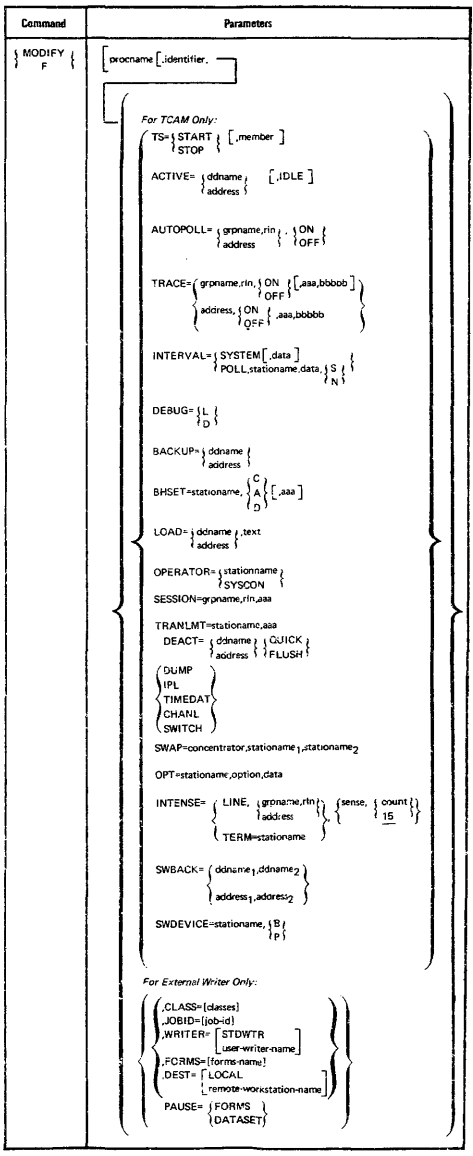
a	an area on a graphics console.
c	one input (A-O) or output (A-Z,0-9) class.
cc	console identification number.
class	one to fifteen job classes (A-O) without priorities.
comment	a 1-100 character identifier.
cuu	the channel and unit address (cuu) on an I/O device.
devicename	a device that was specified, such as 231401 or 231400.
devicetype	a unit type, such as 2540 or 1403, of the output device to be used.
eeee	a four digit decimal number indicating an error count.
hh.mm.ss	hour (00-23), minute (00-59), and second (00-59).
i	a single input class.
id	a two digit identifier that is identical to the identifier included in the system message.
idd	a three digit identification number of the status display.
identifier	a unique one to eight character alphanumeric name that starts with a letter and identifies one task started by a cataloged procedure.
inclass	one to four input queue classes.
I-cuu,O-cuu	the channel and unit addresses (cuu) of the input (I-cuu) and output (O-cuu) devices that make up a composite console.
jobclass	one to fifteen job classes (A-O). Priority of processing is from left to right.
jobname	the name of a specific problem program that appears on the JOB statement.
keyword=option	any valid keyword/option combination that may appear on a DD statement.
n	a single digit decimal number.
nn	a two digit number from 00 to 03.
nnn	a one to three digit decimal number.
outclass	one to eight output classes (A-Z,0-9).
O-cuu	the channel and unit address (cuu) of an output only console.
parm	information, of variable format, to be passed to a problem program.
Pnn	a partition number (P00-P15).
procname	the name of a cataloged procedure that resides on SYS1.PROCLIB.
qclass	one to four queue classes (A-O for input queues, SOUT for the output queue, HOLD for the hold queue).
routecode	a system-to-operator message routing code.
s	a single output class (A-Z,0-9).
text	information of extremely variable format.
tttt	a four digit decimal number indicating an hour limit.
unitaddr	the channel and unit address (cuu) of an I/O device.
volserial	the volume serial number of a disk pack or magnetic tape.
x	a recording mode: either R (record) or Q (quiet).
yy.ddd	the year (60-99) and Julian day (000-366).


Command
Parameters
CANCEL
C
jobname
U=userid
identifier
devicename
unitname
,DUMP
CHNGDUMP
CD
SET
,NODUMP
,SDUMP
,NODUMP
=(option1[,option1]...)
,O=YES
NO
,SYSABEND
,SYSUDUMP
,SDATA=(option2[,option2]...)
,PDATA=(option3[,option3]...)
,PDATA=(option3[,option3]...)
,NODUMP
DEL
,ALL
SDUMP
,ALL
=(option1[,option1]...)
,O=YES
NO
,SYSABEND
,SYSUDUMP
,ALL
,SDATA=(option2[,option2]...)
[,PDATA=(option3[,option3]...)]
,PDATA=(option3[,option3]...)
where
option1 is:
ALLPSA
PSA
NUC
SQA
LSQA
RGN
LPA
TRT
CSA
SWA
option2 is:
ALLSDATA
NUC
SQA
LSQA
SWA
CB
ENQ
TRT
option3 is:
ALLPDATA
PSW
REGS
SA or SAH
JPA
LPA
ALLPA
SPLS
CONTROL
K
C,D,id[,L=cc]
S
,CON=Y
N
,REF
,SEG=nn
,DEL=Y
N
R
RD
,RTME=nnn
,RNUM=nn
D
,N
,HOLD
,F
,H
,L=cca
,U
,L
,PFK
E
[,nn]...
,SEG
,F
,N
,D[,L=cca]
,PFK
A
[,nn]...
,NONE
,REF
,L=cc
T
,REF[,L=cc]
,UTME=nnn[,L=cc]
N,PFX=(nn1
,CMD='text[,text]...'
,KEY=nn2[,nn2]...
[,CON=Y
N]
V,USE=FC
SD
MS
[,L=cc]

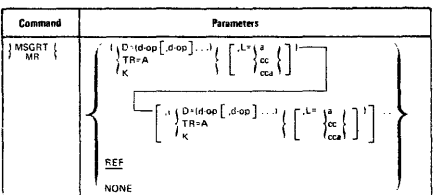
VS2 (JES2) Operator Commands (cont'd)

Command	Parameters
DISPLAY D	U [,TP / ,GRAPHIC / ,TAPE / ,DASD / ,UR] [,ONLINE / ,OFFLINE] [,xxx] [,nnn] (see note below) M [=(CPU / DEV / n / STOR / HIGH) ([,CPU / ,DEV / ,n / ,STOR / ,HIGH] ...)] CONSOLES C,K TS / J [OBS] / A / R [,LIST] TP, (ACT / INACT / LINE / LIST) (grpname,rln / address) (ADDR / QUEUE / TERM) ,stationame OPTION, stationame,optionname INTER PRITERM SECTERM LINE, INACTIVE (STATUS / STORE) (,jobname / ,addr) PFK T [,L= (* / cc / cca)] Note: All commas between DISPLAY U and a specified operand must be supplied. For example, DISPLAY U,,ONLINE.
DUMP	COMM=(text) Notes: 1. Maximum text = 100 characters. 2. This command must be followed by a REPLY command.
HALT Z	EOD TP, (QUICK / FLUSH)
HOLD H	TP=station
LOG L	'text'
MODE	STATUS [DG / SR] [,CPU= ALL] [, (RECORD / QUIET) (=nnn / =ALL)]
MONITOR MN	((JOBNAMES / SESS) [,T] / SPACE / DSNAME / STATUS)
MOUNT M	(unitaddr / devicetype) ,VOL=(NL / SL / AL) ,serial) [,USE= (STORAGE / PUBLIC / PRIVATE)]

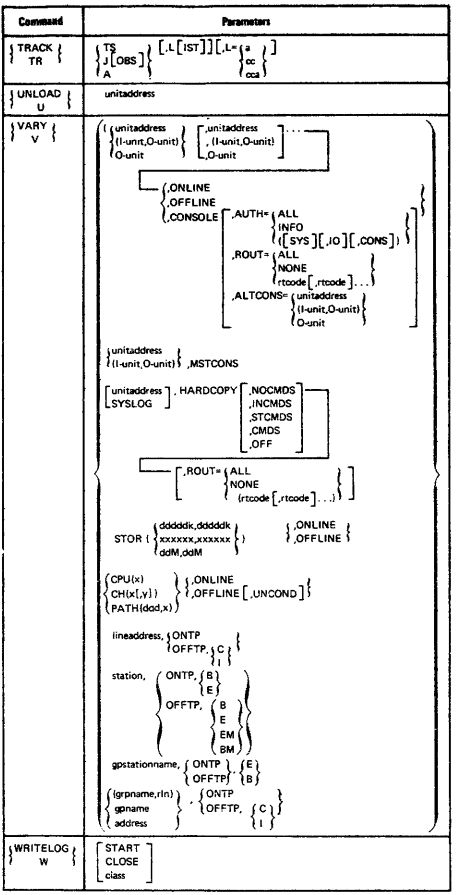
VS2 (JES2) Operator Commands (cont'd)



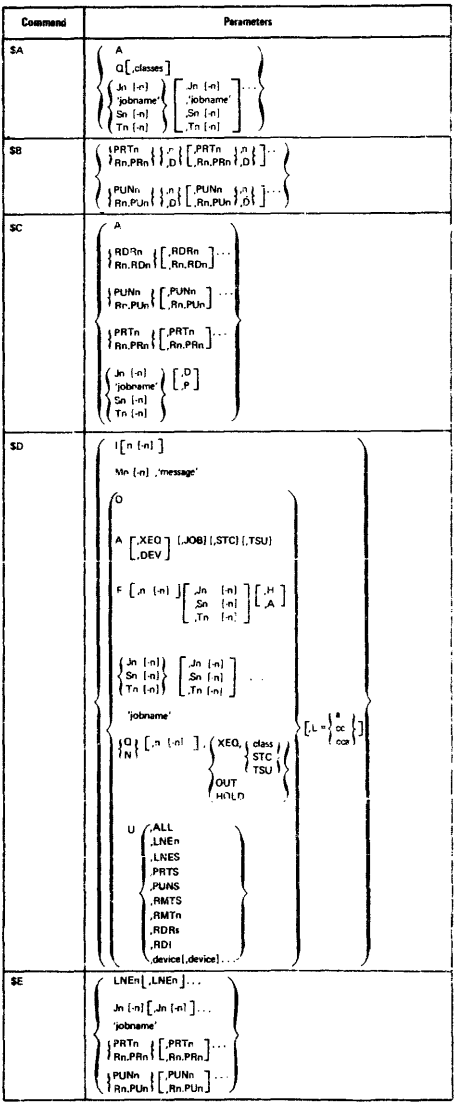
VS2 (JES2) Operator Commands (cont'd)

Command	Parameters
MSGRT MR	
QUIESCE	
REPLY R	id ,text ,U ,ASID=nnnnn ,JOBNAME=name ,SDATA[=option[,option]...] ,STOR=(beg,end[,beg end]...) where options are: NUC LSQA RGN TRT PSA CSA SQA SWA Default values for U or SDATA without = Notes 1. All but id, text is for DUMP reply only. 2. If text is in apostrophes, system will not change lowercase to uppercase
RESET E	jobname,PERFORM=nnn
RELEASE A	TP station-name
SEND SE	"text" msgno ,ALL ,USER=(userid[,userid...]) SAVE ,NOW ,LOGON ,BRDCST ,OPERATOR=rtcode ,CN=console msgno ,LIST ,DELETE LIST
SET T	DATE=yy.ddd[,CLOCK=hh.mm.ss[,JPS=nn]] RESET
START S	procname[.identifier][,devicename], volumeserial][,parmvalue][,keyword=option]...
STOP P	[procname]identifier
STOPMN PM	JOBNAMES SESS SPACE DSNAME STATUS
STOPTR PT	TS A [OBS] ,L=a cc cca
SWAP G	OFF ON xxx,yyy where xxx is "from" unit address and yyy is "to" unit address.
SWITCH I	SMF
TRACE	ON OFF STATUS

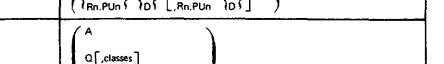
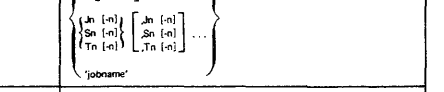
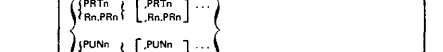
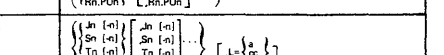
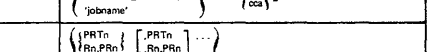
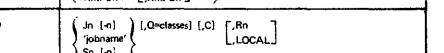
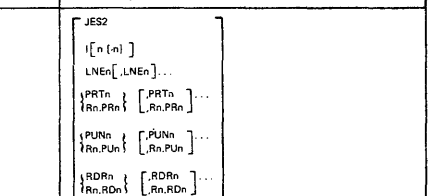
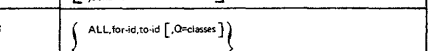
VS2 (JES2) Operator Commands (cont'd)



VS2 (JES2) Operator Commands (cont'd)



VS2 (JES2) Operator Commands (cont'd)

Command	Parameters
$F	
$H	
$I	
$L	
$N	
$O	
$P	
$R	 where *for-id is:* — Jn, Sn, Tn, LOCAL, RMTn, devicename *to-id is:* — LOCAL, Rn, devicename

VS2 (JES2) Operator Commands (cont'd)

Command	Parameters
$S	[A LNEn[,LNEn]... I[n|n] {PRTn / Rn,PRn}{[,PRTn]... / [,Rn,PRn]} {RDRn / Rn,RDn}{[,RDRn]... / [,Rn,RDn]} {PUNn / Rn,PUn}{[,PUNn]... / [,Rn,PUn]}]
$T	({Jn / Sn / Tn}[P={n / +n / -n}] [,C=classes] 'jobname'{,P={n / +n / -n}}{,C=class} Acccc,CANCEL A[cccc][,{I=ssss / (I=ssss,T=hh.mm) / T=hh.mm}][,'$command[;command]...{;}] [,L={3 / cc / cca}] LNEn,P=[password][,E={Y / N}] I[n[-n]],classes C,msglevel,rtcode[,rtcode]... {OSCn / Rn,CON}{,D={T / J / M}} M[a / cc / cca][.[operand...]][,L={a / cc / cca}] {PRTn / Rn,PRn}[,P={Y / N}][,K={1 / 2 / 3 / R}][,S={Y / N}] [,C=id][,T=id][,F=form][,F=AUTOM] ,Q=classes {PUNn / Rn,PUn}[,P={Y / N}][,S={Y / N}][,F=form][,F=AUTOM] ,Q=classes {RDRn / Rn,RDn / RDI}[,A=rr ,H ,R [,C=class][,Q=class]])
$V	S,'command'[,'command']. .
$Z	(A I[n[-n]] {PRTn / Rn,PRn}{[,PRTn]... / [,Rn,PRn]} {RDRn / Rn,RDn}{[,RDRn]... / [,Rn,RDn]} {PUNn / Rn,PUn}{[,PUNn]... / [,Rn,PUn]})

HASP commands have the following form:

$verb operand1,operand2. . . , operandn

Where:

$ = HASP command identification character—all commands to the HASP SYSTEM start with the $ character.

verb = HASP command verb—a single character verb which describes the general action which is to be taken. A longer form of the verb may be used which is partially compatible with former versions of the HASP SYSTEM.

operands = HASP command operands—operands are used to modify the verb of the command or identify the job or system facility to be acted upon. Commas are used to separate operands when more than one operand is used.

NOTE: If more operands are entered than the command is designed to handle, the additional operands will either be ignored or be concatenated to the last acceptable operand and handled as one.

The HASP command structure allows for a great amount of flexibility in entering the text of the command. The following rules apply:

1. FOR TEXT OUTSIDE PAIRED APOSTROPHES:

   A. All alphabetic characters may be entered in upper or lower case.

   B. Blanks may be inserted at any point in the command after the initial $ for operator convenience.

   C. Apostrophes may appear in the text of the command as a *text* character; however, each apostrophe text character must appear in duplicate.

2. FOR TEXT INSIDE PAIRED APOSTROPHES:

   All characters must appear as required by the individual command. Text apostrophes must appear in duplicate.

3. Key words for operands may, for the most part, be misspelled. It is only necessary to enter enough information to identify the job or facility desired.

The following examples illustrate the above rules:

1. Sr all, rmt 4, local
   $RALL,RMT4,LOCAL

2. $dm4,'If your job''s output is deleted, resubmit'
   $DM4,'IF YOUR JOB'S OUTPUT IS DELETED,RESUBMIT'

3. $a all or $a a
   $AA

NOTE: The first line of each example represents the operator's input. The second line represents the internal meaningful representation with the first character of each operand underlined.

HASP COMMAND VERBS

Command	Definition	Operand Types
$A	RELEASE	All jobs or specific jobs
$B	BACKSPACE	Printers
$C	CANCEL	Device functions or jobs
$D	DISPLAY	Disk, units, lines, remotes, messages, jobs, queues, activity, initiators, or operator requests
$E	RESTART	Device functions, or jobs in execution
$F	FORWARD SPACE	Printers
$H	HOLD	All jobs or specific jobs
$I	INTERRUPT	Printers
$N	REPEAT	Device function
$P	STOP (AFTER CURRENT FUNCTION)	Device, initiator, system, or job
$R	ROUTE OUTPUT	By routing group or job
$S	START	Device, initiator, or system
$T	SET	Device, initiator, job, message routing or system job number base
$Z	HALT (IMMEDIATE)	Device

ALTERNATE HASP COMMAND VERBS

Alternate Form	Short *	Sample Input–Comments
$ALTER	$T	$ALTER JOB4, P=+4 – up job 4 priority by 4
$BACKLOG	$DQ	$BACKLOG – display number of queued jobs
$BACKSRACE	$B	$BACKSPACE PRT1 – backspace printer 1
$DEFINEI	$TI	$DEFINE I1,ABC – set initiator classes
$DEFINE	$DI	$DEFINE – list all initiator status information
$DELETEJ	$PF	$DELETE JOB 4 – purge job 4 after current activity
$DELETE	$C	$DELETE PRT2 – cancel current output on printer 2
$DISPLAY	$D	$DISPLAY DISKS $DISPLAY UNITS $DISPLAY RMTS
$DRAIN	$P	$DRAIN I – stop all further execution $DRAIN I2 – stop further execution with initiator 2 $DRAIN PRT1 – stop printing on printer 1 after current job
$LIST	$T	$LIST CON1,15 – list only message classes above 15
$LOCATE	$D	$LOCATE JOB 4 – display job information about job 4
$HOLD	$H	$HOLD ALL – prevent all jobs from beginning activity $HOLD JOB 4 – prevent JOB 4 from beginning activity
$IDJ	$D	$IDJ JOB 3 – display job information about job 3 $IDJ 'ABCJOB' – display job information about all jobs with name 'ABCJOB'
$RELEASE	$A	$RELEASE ALL – release all jobs in queue if held by $HOLD ALL $RELEASE JOB 6 – release job 6

* The short form listed in this table is the character string to which the ALTERNATE FORM is converted. Thus verbs such as: $IDJ, $LOCATE, $DISPLAY are all converted to $D and are therefore equivalent.

The syntax of each command is checked *after* the short form has been generated. Therefore the operator should attempt to use the short form of the command in preference to the long form.

ALTERNATE HASP COMMAND VERBS (Cont'd.)

$REPEAT	$N	$REPEAT PRT1 – repeat the current function on printer 1
$RESTART	$E	$RESTART LNE3 – abort current activity and start over
$ROUTE	$R	$ROUTE ALL,RMT3,LOCAL – remote output
$SETJOBNO.TO	$TJ	$SET JOB NO. TO 4 – set system-generated job number base
$SPACE	$T	$SPACE PRT1,C=1 – single space each line on printer until next data set
$START	$S	$START – start job processing $START LNE3,QXZ3 – start line with password
$STATUS	$DA	$STATUS – list current activity
$STOP	$Z	$STOP PRT1 – suspend operations until $START

* The short form listed in this table is the character string to which the ALTERNATE FORM is converted. Thus verbs such as: $IDJ, $LOCATE, $DISPLAY are all converted to $D and are therefore equivalent.

  The syntax of each command is checked *after* the short form has been generated. Therefore the operator should attempt to use the short form of the command in preference to the long form.

HASP COMMAND SUMMARY

Command	Remote Source	Comments
JOB QUEUE		
$AA	NO	Release all jobs
$DA	YES	Display active jobs
$DF	YES	Display number of queued jobs awaiting different output setups
$DN	YES	Display job information on queued jobs
$DQ	YES	Display number of queued jobs
$HA	NO	Hold all jobs currently in the system
JOB LIST		
$A job list	IF OWNER	Release specified job(s)
$C job list	IF OWNER	Cancel specified job(s)
$D job list	IF OWNER	Display job information on specified job(s)
$E job list	NO	Restart execution of specified job(s)
$H job list	IF OWNER	Hold specified job(s)
$P job list	IF OWNER	Stop specified job(s) after current activity
MISCELLANEOUS JOB		
$A 'job name'	IF OWNER	Release job by OS job name
$C 'job name'	IF OWNER	Cancel job by OS job name
$D 'job name'	YES	Display job information on job(s)
$E 'job name'	NO	Restart execution of job by OS job name
$H 'job name'	IF OWNER	Hold job by OS job name
$P 'job name'	IF OWNER	Stop job by OS job name
$T Jx . . . j , operand	NO	Set job class or priority – c=class or p=priority
$T Jx . . . j	NO	Set HASP internal job number

Only the characters required to recognize the uniqueness of each command are defined in this table. For complete entry format, see the individual command description in the HASP operator's guide.

DEVICE LIST		
$B device list	IF OWNER	Backspace device(s)
$C device list	IF OWNER	Cancel current function on device(s)
$E device list	IF OWNER	Restart current function on device(s)
$F device list	IF OWNER	Forward space device(s)
$I device list	IF OWNER	Interrupt the current function on printer(s)
$N device list	IF OWNER	Repeat current function on device(s)
$P device list	IF OWNER	Stop the device(s)
$S device list	IF OWNER	Start device(s)
$T device	IF OWNER	Set device
$Z device list	IF OWNER	Halt device(s) (suspend operation)
SYSTEM		
$DI	YES	Display initiator(s), classes and status
$PI	NO	Stop initiator(s) after current activity
$SI	NO	Start initiator(s)
$TI	NO	Set initiator classes
$P	NO	Stop system
$PHASP	NO	Terminate HASP job
$S	NO	Start system
$TF	NO	Set FCB image for 3211 carriage control C=V
$TM	NO	Set message routing of command responses
MISCELLANEOUS DISPLAY		
$DD	YES	Display direct-access devices
$D line n	YES	Display HASP Remote Job Entry line
$DO	YES	Display operator requests
$DR	YES	Display devices on remote(s)
$DU	YES	Display local unit record devices
REMOTE JOB ENTRY		
$DM	YES	Display message
$DS	YES	Display special routing output
$R	IF OWNER	Route output for specified job or device group to another device group

Only the characters required to recognize the uniqueness of each command are defined in this table. For complete entry format, see the individual command description in the HASP operator's guide.

VM/370 Commands

Sources: GX20-1926 IBM Virtual Machine Facility/370 Quick Guide for Users
GC20-1086 IBM Virtual Machine Facility/370 Operator's Guide, Release 2

CP commands are divided into eight classes according to type of user. Operator classes are A, B and D. Class G commands are for General Users and apply to the Virtual Machine. They are included here because in some installations operators may also be general users.

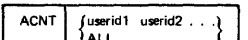
CP commands may be entered in lowercase, uppercase, or both. Many CP commands can be truncated. The truncated version is represented here by capital letters. You may use the truncated version or the long form.

The CP commands and their formats shown here are arranged by function. Commands that apply to the Real Machine are indicated by R, those that apply to the Virtual Machine by V.

A summary of CMS commands and the format of some frequently used CMS commands follow.

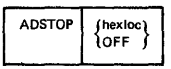
ACNT (R) CP Class A

Creates accounting records.



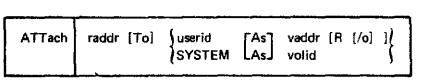
ADSTOP (V) CP Class G

Halts the virtual machine's execution.



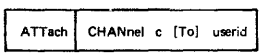
ATTACH (R) CP Class B

Attaches a real device to a specified user or to the system.



ATTACH CHANNEL (R) CP Class B

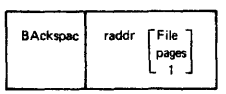
Attaches a channel to a designated user.



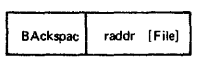
BACKSPAC (R) CP Class D

Restarts a current spool file.

Printer Format

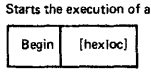


Punch Format



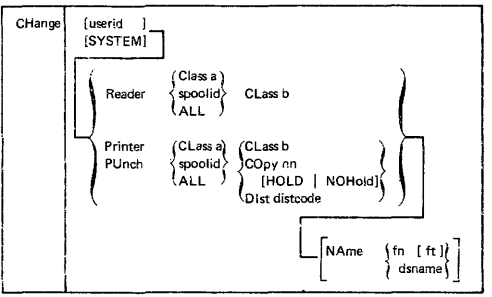
BEGIN (V) CP Class G

Starts the execution of a virtual machine.



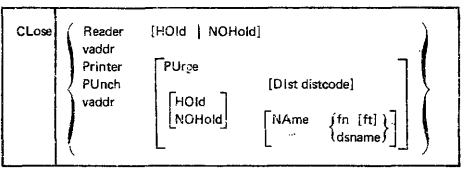
CHANGE (R,V) CP Classes D,G

Alters the attributes of a closed spool file.



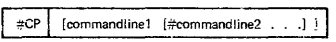
CLOSE (V) CP Class G

Terminates spooling operations on a virtual reader, printer, or punch.



CP CP Any Class

Allows any virtual machine operator to execute a CP console function from a virtual console read without first having to press the "attention" key to get to the CP console function environment.

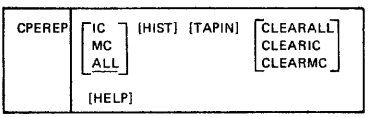


The example that follows shows how #CP is used:

Command	System Action
#CP	User enters CP environment
#CP query files	QUERY command executed
#CP query files#query users	QUERY command execution twice
data entered¢#CP msg op is tape available	MSG command executed
#CP data entered	CP environment is entered and invalid command line is read
data entered ¢#CP	CP environment entered
#CP query files¢data entered	QUERY is not executed; invalid command line entered in CMS environment

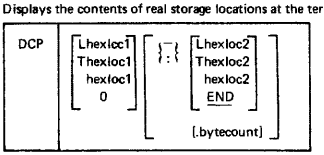
Service Program and Error Recording

- Edits and prints an existing history tape and optionally creates a duplicate history tape.
- Edits and prints only the I/O errors from an existing history tape and optionally creates another history tape containing only the I/O errors.
- Edits and prints only the machine check and channel check errors from an existing history tape, and, optionally creates another history tape containing only the machine check and channel check errors.
- Clears from the error recording cylinders all error records, all I/O error records, or all machine check and channel check error records. (Only users with Class F command privileges can do a clear operation.)



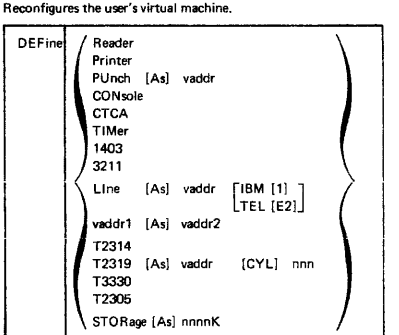
DCP CP Class E

Displays the contents of real storage locations at the terminal.



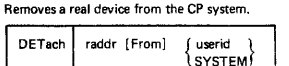
DEFINE (V) CP Class G

Reconfigures the user's virtual machine.



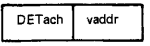
DETACH (R) CP Class B

Removes a real device from the CP system.



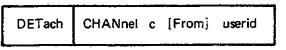
DETACH (V) CP Class G

Detaches a virtual device from the virtual machine.



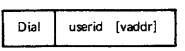
DETACH CHANNEL (R) CP Class B

Removes the specified channel and all its related devices from the specified user.



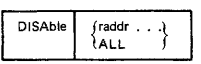
DIAL (V) CP Class ALL

Attaches a terminal device to a multiple access system.



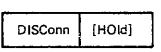
DISABLE (R) CP Classes A,B

Inhibits the use of communication lines.



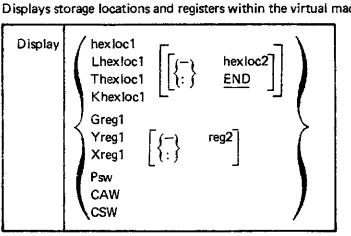
DISCONN (V) CP Class ALL

Disconnects the terminal from virtual machine operation.



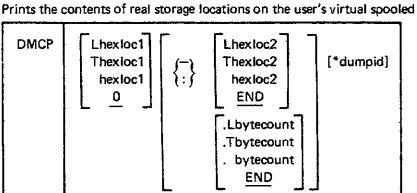
DISPLAY (V) CP Class G

Displays storage locations and registers within the virtual machine.



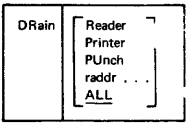
DMCP CP Class E

Prints the contents of real storage locations on the user's virtual spooled printer.



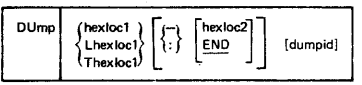
DRAIN (R) CP Class D

Stops spooling activity on the specific device after the current file is finished spooling.



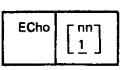
DUMP (V) CP Class G

Dumps virtual machine registers and storage to the virtual printer.



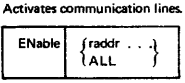
ECHO (V) CP Class G

Returns data directly to the terminal.



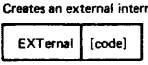
ENABLE (R) CP Classes A,B

Activates communication lines.



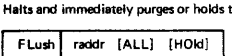
EXTERNAL (V) CP Class G

Creates an external interrupt condition on the virtual machine.



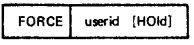
FLUSH (R) CP Class D

Halts and immediately purges or holds the current spool file..



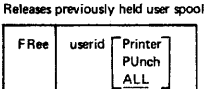
FORCE (R) CP Class A

Forces logout of the named user.



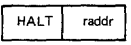
FREE (R) CP Class D

Releases previously held user spool files.



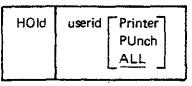
HALT (R) CP Class A

Stops any active channel program on the real device specified.



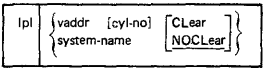
HOLD (R) CP Class D

Defers processing of specified spool output.



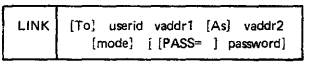
IPL (V) CP Class G

Initiates a program load on the virtual machine.

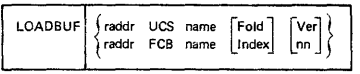


LINK (V) CP Class G

Permits one user to access mini-disks belonging to another user.

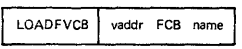


LOADBUF (R) CP Class D



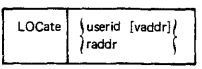
LOADVFCB (V) CP Class G

Loads a forms control image for a virtual 3211 printer.



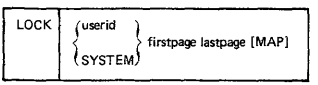
LOCATE CP Class E

Finds the addresses of CP control blocks associated with a particular user, a user's virtual device, or a real system device.



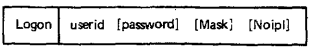
LOCK (V) CP Class A

Locks specified pages in processor storage.



LOGON (V) CP Class ALL

Initiates all virtual machine operation.



LOGOUT (V) CP Class ALL

Terminates a terminal session.

LOGout LOGoff	[HOld]

MONITOR (R) CP Classes A,E

Initiates or terminates the recording of events that occur in the real machine.

MOnitor	[START] [STOP]

MSG (V) CP Classes A,B

Sends text messages to other users or the system operator.

Message MSG	{ ALL userid * OPerator }	msgtext

CP Class Any

Message MSG	{ userid * OPerator }	msgtext

NETWORK CP Classes A,E,F

Can only be used if one or more 3704/3705 Communications Controllers are controlled by a VM/370 environment to:

- Initiate 3704/3705 Load operations
- Cause 3704/3705 dump operations
- Enable or disable line resources
- Vary Line resources online or offline
- Alter the operating mode of a Partitioned Emulator Program.
- Halt a particular line resource.
- Cease all 3704/3705 operations
- Query and display 3704/3705 resource status and storage.
- Trace activity to and from a 3705/3704 or a particular resource

The format of the NETWORK command for the A privilege class user is:

NETWORK	HALT resource SHUTDOWN [ALL | raddr]

The format of the NETWORK command for the A and B privilege class user:

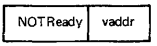
NETWORK	LOAD raddr nopname DUMP raddr [IMMED | OFF | AUT] ENable [ALL | [resource [resource . . .]]] DISAble [ALL | [resource [resource . . .]]] Query [ALL | [resource [resource . . .]]] DISPLAY raddr hexloc1 [{ – | : } [hexloc2 | END]] Vary {ONline | OFFline | EP | NCP} [resource [resource . . .]]

The format of the Class F NETWORK command is:

NETwork	TRACE {BTU raddr | resource | END}

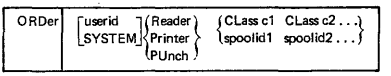
NOTREADY (V) CP Class G

Simulates the loss of ready status on a virtual spooled unit record device.



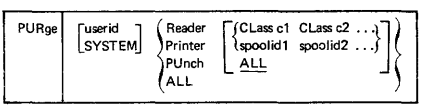
ORDER (R.V) CP Classes D,G

Provides a technique for ordering closed spool files.



PURGE (R.V) CP Classes D,G

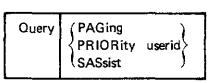
Deletes a spooled file before reading, printing, or punching occurs.



QUERY (R.V) CP Classes A,B,D,E,F,Any

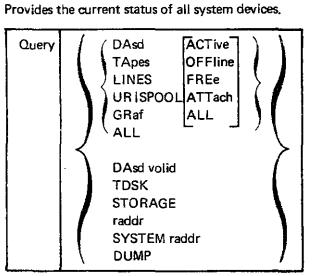
Requests system status and machine configuration information.

The format of the CLASS A and P QUERY command is:



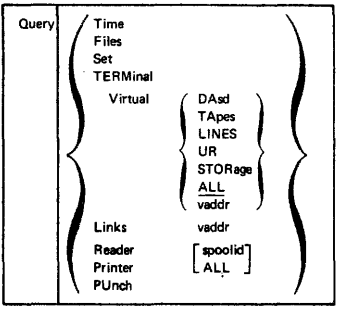
QUERY (R) CP Class B

Provides the current status of all system devices.



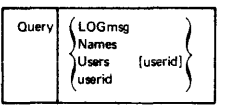
QUERY (V) CP Class G

Provides the virtual machine user with the current status of his virtual machine, spooling devices and spool files.



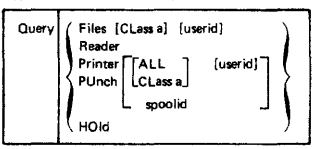
QUERY (V) CP Class ALL

Provides the remaining portion of the log message, and the names and real address of other logged on users.



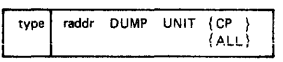
QUERY CP Class D

Types basic information on spool files.



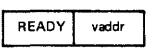
QUERY DUMP CP Class D

Indicates that the device of device type "type" located at raddr is the system dump unit.



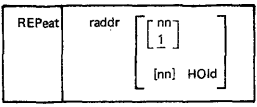
READY (V) CP Class G

Makes a device end interrupt pending for the specified virtual device.



REPEAT (R) CP Class D

Increases the copies of, or holds, an output spool file.

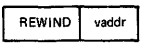


RESET (V) CP Class G

Clears all pending interupts and resets error conditions on the device specified.

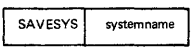
REWIND (V) CP Class G

Rewinds a real tape drive.



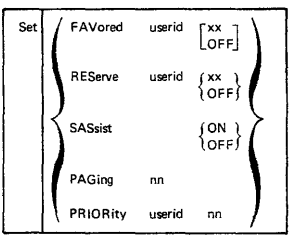
SAVESYS CP Class E

Saves a virtual machine storage space with registers and PSW as they currently exist.



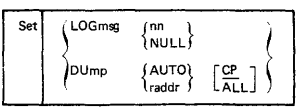
SET (R) CP Class A

Sets special CP preferred options.



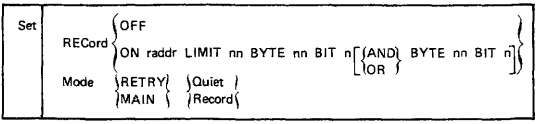
SET (R) CP Class B

Establishes disposition for log messages and dumps.



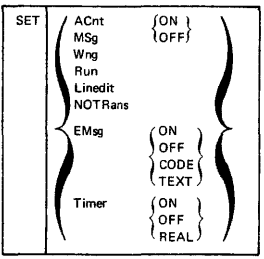
SET CP Class F

Record sets the recording mode for a device and Mode sets the recording mode for soft errors



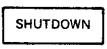
SET (V) CP Class G

Sets virtual machine options.



SHUTDOWN (R) CP Class A

Checkpoints and terminates the current VM/370 operation.

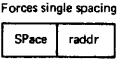


SLEEP (V) CP Class ALL

Places the virtual machine in a dormant state wiht the terminal keyboard locked.

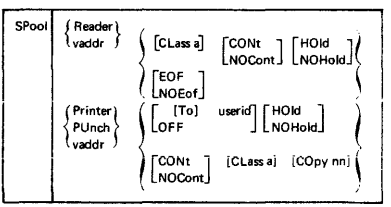
SPACE (R) CP Class D

Forces single spacing on the printer.



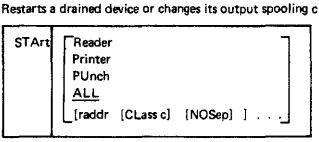
SPOOL (V) CP Class G

Changes spooling control options.



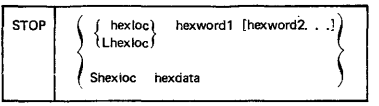
START (R) CP Class D

Restarts a drained device or changes its output spooling class.



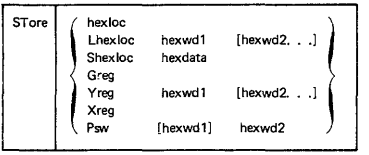
STOP CP Class C

Alters the contents of real storage.



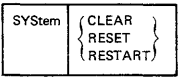
STORE (V) CP Class G

Alters virtual machine storage, PSW, and registers.



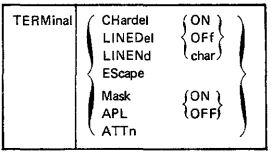
SYSTEM (V) CP Class G

Simulates virtual machine console functions.



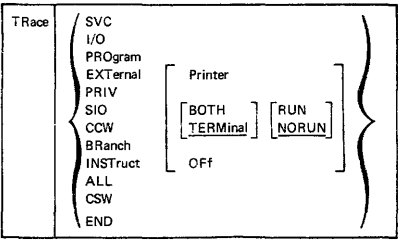
TERMINAL (V) CP Class G

Changes parameters for terminal operations.



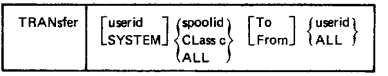
TRACE (V) CP Class G

Traces and records program execution.



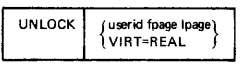
TRANSFER (R,V) CP Classes D

TRANSFERS command to direct an input spool file to a specified user's virtual spool input, or to reclaim input spool files that originated from the specified user.



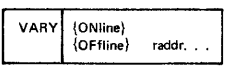
UNLOCK (R) CP Class A

Releases storage.



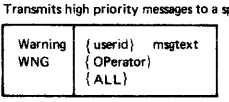
VARY (R) CP Class B

Varies the availablility of a device.



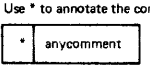
WARNING (R) CP Classes A,B

Transmits high priority messages to a specified user or to all users.



ASTERISK CP Class ALL

Use * to annotate the console sheet with a comment.



Summary of CMS Commands

Source: GC20-1806-1

This section contains summary descriptions of the commands acceptable in the CMS environment. Although the operator may not need to use all of them, they are included for ease of reference.

Command	Usage
ACCESS	Define direct access space to a CMS virtual machine, and relate the disk space to a logical directory.
ASSEMBLE	Assemble Assembler Language source code
BASIC	Compile and execute VM/370 BASIC programs
CMSBATCH	Invoke the CMS Batch Facility
COBOL[1]	Compile ANS Version 4 COBOL source code
COMPARE	Compare all or part of records in two existing disk files
CONVERT[1]	Convert free form FORTRAN statements to fixed form
COPYFILE	Copy files according to specifications
CP	Enter CP console functions from CMS environment
CPEREP	Dump error information which has been recorded by VM/370 error recording routine
DDR	Perform backup, restore and copy operations for minidisks
DEBUG	Enter DEBUG subenvironment
DIRECT	Set up VM/370 Directory entries.
DISK	Perform disk-to-card and card-to-disk operations for CMS data sets
EDIT	Enter EDIT subenvironment
ERASE	Delete files from user disks
EXEC	Process special procedures made up of frequently used sequences of commands
FILEDEF	Provide simulation of OS JCL data definition (DD) statements
FORMAT	Prepare disks in CMS 800-byte block format
FORTGI[1]	Compile FORTRAN source code using G1 compiler
FORTHX[1]	Compile FORTRAN source code using H-extended compiler
GENDIRT	Create auxiliary module directories
GENMOD	Generate absolute non-relocatable file (MODULE files)
GLOBAL	Define CMS libraries to be searched for macros and subroutines
GOFORT[1]	Compile FORTRAN source code and execute program just compiled using Code and Go compiler
INCLUDE	Bring additional TEXT files into storage
LISTDS	List any or all data sets on an OS disk

[1]These commands are used to invoke IBM Program Products, which are available through IBM for a license fee.

Summary of CMS Commands (cont'd)

Command	Usage
LISTFILE	List information about user CMS files
LOAD	Bring TEXT files into storage and establish linkages
LOADMOD	Bring a single MODULE file into storage
MACLIB	Perform maintenance on macro libraries
MINIDASD	Previously used in VM/370 to format disk volumes in DOS or OS format. It is not a part of VM/370 Release 2; this has been replaced in Release 2 with the MINIDASD function of the OS utility IBCDASDI.
MODMAP	Type load map of a MODULE file
MOVEFILE	Move data from one device to another device of the same or different type
PLIOPT[1]	Compile PL/I source code (using optimizing compiler)
PRINT	Spool a specified file to the printer
PUNCH	Spool a specified file to the punch
QUERY	Request information about the virtual machine
READCARD	Read data from spooled card input device
RELEASE	Make a disk and its directory inaccessible to a virtual machine
RENAME	Change the name of a CMS file or files
RUN	Initiate series of functions to be performed on a file
SCRIPT[2]	Compose and print the specified file
SET	Establish, set, or reset virtual machine characteristics
SORT	Arrange a specified file in ascending order according to specified fields in the data record
START	Begin execution of programs previously loaded
STATE	Verify the existence of a file
SVCTRACE	Record information about supervisor calls
SYNONYM	Specify alternate names by which certain commands may be invoked
TAPE	Performs tape-to-disk and disk-to-tape operations for CMS data sets
TAPPDS	Load OS partitioned data set (PDS) files from tape to disk
TESTCOB[1]	Compile COBOL source code using the COBOL Interactive Debug Compiler.
TESTFORT[1]	Enter a debugging environment for FORTGI[1] and GOFORT[1] programs

[1]These commands are used to invoke IBM Program Products, which are available through IBM for a license fee.
[2]This command invokes a text processor which is an IBM User Installed Program, available from IBM for a license fee.

Summary of CMS Commands (cont'd)

Command	Usage
TXTLIB	Perform maintenance on text libraries
TYPE	Type all or part of a file at the terminal
UPDATE	Make changes in a file as defined by control cards in a record file
VMPDUMP	Convert system ABEND dumps to printer output.
ZAP	Provides a means of modifing members of CMS LOADLIBS as created by the CMS command LKED

[1]These commands are used to invoke IBM Program Products, which are available through IBM for a license fee.
[2]This command invokes a text processor which is an IBM User Installed Program, available from IBM for a license fee.

Invoking the Batch Facility **CMS**

The Batch Facility virtual machine is invoked by the batch operator when he issues the CP IPL command followed by the CMSBATCH command. This sequence takes the form:

```
ipl cms
CMS mm/dd/yy WED 17.58.48
cmsbatch
Y/S (19E) R/O.
THE FOLLOWING NAMES ARE UNDEFINED:
  BATEXIT1 BATEXIT2
R; T=0.14/0.39 08:47:40
WAITING FOR THE READER
```

The operator may now disconnect the batch machine terminal, if he wishes, using the CP DISCONN command. The Batch Facility will IPL itself after each job is executed.

COPYFILE **CMS**

Copies files according to operand specifications.

```
COPYfile  fileid1 [fileid2. . . ]
                  [ (options) ]

options:

[Type    ][OLDDate][RECfm F][NOPrompt] [TRAns]
[NOType  ][NEWDate][RECfm V][PRompt  ]

[UPcase ] [From recno       ] [FOR recno       ]
[LOWcase] [FRLabel xxxxxxxx ] [TOLabel xxxxxxxx]

[REPlace] [Fill c ] [TRUnc ] [PAck  ] [EBcdic]
[OVlv   ] [Fill hh] [NOTRunc] [UNPack]
[APpend ] [Fill 40]
[NEWFile]          [LRecl nn] [SPecs  ]
                              [NOSPecs]
```

DDR **CMS**

INVOKING DDR UNDER CMS

```
DDR  [filename [filetype [filemode] ]
                         [   *    ]
```

INVOKING DDR AS A STANDALONE PROGRAM

To use DDR as a standalone program, the operator should IPL it from a real or virtual IPL device as he would any other standalone program. Then indicate where the DDR program is to obtain its control statements by responding to prompting messages at the console.

DIRECT **CMS**

To build a user directory on a system-owned volume using preallocated cylinders.

```
DIRECT  [filename [filetype [filemode ] ] ] (EDIT)
```

If running under VM/370, a normal completion results in the newly created directory being dynamically swapped, and placed in use by VM/370 (providing the user's class is A, B or C and the directory volume is present in the system owned LIST). In either case the directory is updated on the directory volume.

EDIT **CMS**

Provides access to the EDIT environment

EDIT	filename filetype [filemode [(LRECL nnn)]]

The CMS user can issue the following subcommands after he has issued an EDIT command.

Subcommand	Usage
TOP	Moves the current line pointer to the top of the file.
BOttom	Moves the current line pointer to the bottom of the file.
DOwn n	Moves the current line pointer down the file the number of lines specified.
Up n	Moves the current line pointer up the number of lines specified.
Type n	Types the number of lines specified, starting at the current pointer position.
DELete n	Deletes this line or the number of lines specified.
Change /xx/yy/	Changes the data string xx to the value yy.
Input xxx	Inserts the text represented by xxx after the line at which the pointer is positioned.

FORMAT **CMS**

Formats a disk for use by CMS.

FORMAT	ccu mode [nocyl] [(Recomp) ! (LABEL)]

LISTFILE **CMS**

Lists information about CMS files

Listfile	[[fn [ft [fm]]] [(options)]

options:
[Header ! NOHeader] [EXec ! APpend]
[FName ! FType ! FMode ! FOrmat ! ALloc ! Date ! Label]

MOVEFILE **CMS**

Moves data from one device to another device.

MOVEfile	[input-ddname / INMOVE] [output-ddname / OUTMOVE]

NCPDUMP (Service Program) **CMS**

Processes CP spool reader files created by 3704/3705 dumping operations, that is, dump files that are produced as a result of the CP NETWORK command with the DUMP operand specified and with either automatic or immediate mode specified.

NCPDUMP Command:

Although NCPDUMP is a CMS command, its effective use is restricted to the specific user identified by the SYSDUMP operand of the SYSOPER macro in DMKSYS used during VM/370 system generation. The operation of NCPDUMP is similar to VMFDUMP operations.

```
NCPDUMP  [DUMPxx]  [ ([ERASE] [NCFORM] [MNEMONIC] [) ] ]
```

PRINT **CMS**

Directs a specified spool file to the virtual printer.

```
PRint  fn ft [fm]  [ (options) ]
```

```
options:
[ cc   ]  [MEMber    *   ]  [UPcase] [HEX]
[ NOCC ]  [MEMber  name  ]
```

PUNCH **CMS**

Directs a specified spool file to the virtual punch.

```
PUnch  fn ft [fm]  [ ([ NOHeader ]  [MEMber    *   ] ) ]
                   [ Header     ]  [MEMBER  name  ]
```

QUERY **CMS**

Permits the user to obtain specified information about his virtual machine's CMS functions.

```
Query  BLIP
       RDYMSG
       LDRTBLS
       RELPAGE
       IMPCP
       IMPEX
       ABBREV
       REDTYPE
       PROTECT
       SEARCH
       DISK  [mode]
             [  *  ]
       SYNONYM  {SYSTEM}
                {USER  }
                {ALL   }
       FILEDEF
       MACLIB
       TXTLIB
       LIBRARY
       INPUT
       OUTPUT
```

READCARD **CMS**

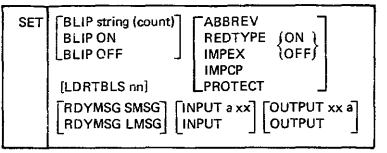
Reads data from the spooled card input device.

```
READcard  { fn ft [fm]  }
          { *  [=[fm]] }
          {    [ A ]  }
```

SET

CMS

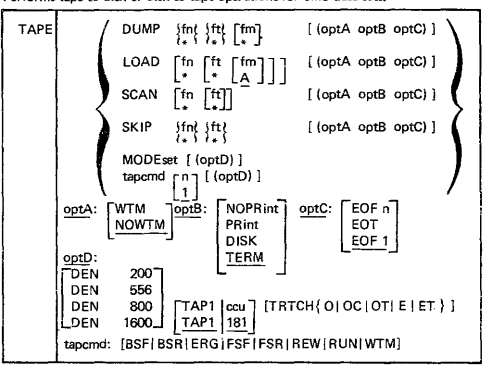
Sets or resets CMS virtual machine characteristics.



TAPE

CMS

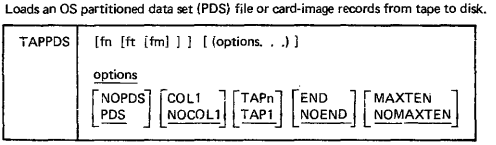
Performs tape to disk or disk to tape operations for CMS data sets.



TAPPDS

CMS

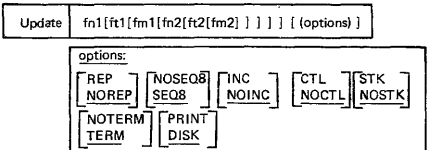
Loads an OS partitioned data set (PDS) file or card-image records from tape to disk.



UPDATE

CMS

Makes changes in file as defined by control cards in a record file.

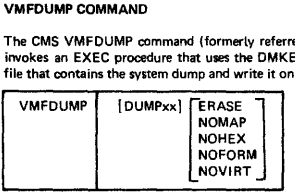


VMFDUMP (Service Program)

Creates dump files

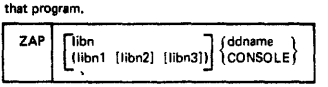
VMFDUMP COMMAND

The CMS VMFDUMP command (formerly referred to as VDUMP in Release 1 of VM/370) invokes an EXEC procedure that uses the DMKEDM program to read the CP spool reader file that contains the system dump and write it on the CMS A-disk.



ZAP **CMS**

This command (though primarily intended for the system programmer) could allow the system operator to access 3704/3705 LOADLIB members, find a precise point within the program, verify the authenticity of that location, and then modify the contents to modify that program.



RES Central Operator Commands

Source: GC24-5091-3 OS/VS1 Programmer's Reference Digest

Operator commands that require no modification for RES. These commands are not valid from RES workstation.

CONTROL	SET
DEFINE	SWAP
DUMP	SWITCH
HALT	UNLOAD
LOG	VARY
MODE	WRITELOG

Operator commands that use additional operands for RES.

CANCEL	REPLY
DISPLAY	RESET
HOLD	START*
MODIFY	STOP
MONITOR	STOPMN
RELEASE	WRITER

*Command not valid from workstation.

New operator commands for RES.

LISTBC	ROUTE
LOGON	SEND
LOGOFF	

RES Workstation Operator Command Outline

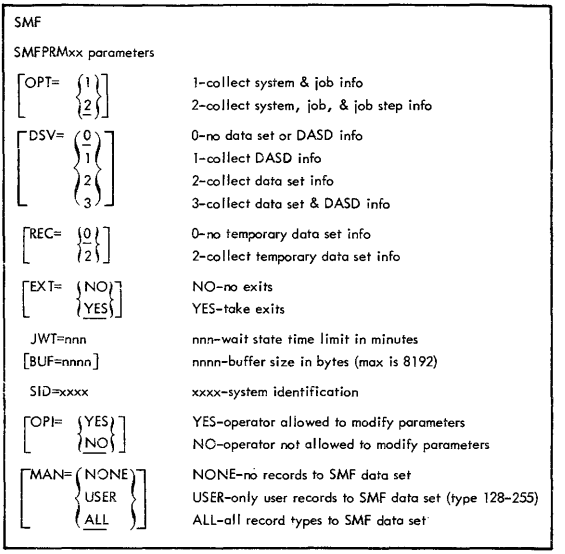
Operation	Operand
{CANCEL | C}	{[JBN=]jobname ! (jobname,jobname,...) {[,DUMP][,ALL] | [,IN[=class ! HOLD]] | [,OUT[=class ! HOLD]]} | [DEV=] unitaddr ! (unitaddr,unitaddr,...)}
{DISPLAY | D}	{T | R | jobname!(jobname,jobname,...)[,HOLD] | O[=list] | N[=list] | USER [,L | =userid]}
{HOLD | H}	jobname !(jobname,jobname,...) [,OUT [=outclass[outclass...] | =(outclass,outclass,...)]]
{LISTBC | LB}	[NOTICES[,MAIL] | MAIL[,NOTICES]]
{LOG | L}	'text'
LOGOFF	
LOGON	userid[/password] TERM (term-id) [PROC(procname)] [NOTICES | NONOTICES] [MAIL | NO MAIL]
{MODIFY | F}	{[procname.]id | unitaddr | procname.Pnn, 'data'} [,TYPRUN=HOLD ! NOHOLD] [,CLASS=classnames] [,PAUSE=FORMS ! DATASET]
{MONITOR | MN}	JOBNAMES[,T]
{RELEASE | A}	jobname ! (jobname,jobname,...) [,OUT [=outclass[outclass...] | =(outclass,outclass,...)]]
{REPLY | R}	msgno {BLANK | ,'text' | ,text}
{RESET | E}	jobname ! (jobname,jobname,...)[,PRTY=priority[,OUT=outclass]] [,CLASS=class,OUT=outclass]
{ROUTE | RO}	{JBN=jobname[,GROUP=list] | ALL[,GROUP=list] | GROUP=list} [,CLASS=outclass] [,DEST=userid] [,HOLD=YES ! No]
{SEND | SE}	'text' [,USER=(userid[,userid]...) [,{NOW | TOGON | SAVE}]] [,OPERATOR[=route-code]]

RES Workstation Operator Command Outline (cont'd)

Operation	Operand
{START / S}	procname[.id] [,unitaddr] [,,jobname ! ,,outclass] [,keyword=option,...]
{STOP / P}	[identifier ! (identifier,identifier,...)] [procname.identifier ! (procname,identifier,..)] [unitaddr ! (unitaddr,unitaddr,...)] Specify at least one operand, or any combination up to 5.
{STOPMN / Pn}	JOBNAMES
{WRITER / WTR}	unit { ,HOLD / ,FSP=DS ! nnn / ,BSP=DS ! JOB ! nnn / ,REPEAT=nnn ! (nnn,JOB) / ,LSP=n ! C } [,JBN=jobname]

Definitions of Substitutional Operands- RES

class	specifies an input or output class.
classnames	1-8 output class names to be associated with the writer.
data	specifies information to be passed to the procedure.
devicetype	specifies a device type (for example, PR1).
id	specifies any unique one to eight character name that starts with a letter (except for Pnn or ALL).
inclass	specifies an input queue class.
jobname	specifies the name of a specific problem program.
list	specifies one to four queue classes.
msgno	one or two character identification of a message reply.
n	1, 2, 3 (single space, double space, or triple space).
(n,...)	specifies a single digit decimal number, or a list of numbers.
nnn	specifies a decimal digit from 1 to 255.
nnn.aam	nnn specifies a workstation (1-200), aa identifies a device type (RD, PR, PU), m identifies a particular device.
nbs	specifies a decimal digit from 1 to 100 (indicates the number of pages to be backspaced).
nfs	specifies a decimal digit from 1 to 255 (indicates the number of pages to be spaced forward).
outclass	specifies an output class.
password	specifies an assigned sequence of one to eight alphameric characters.
Pnn	specifies the VS1 partition number in which the procedure was started.
pp	specifies numerical priority (decimal number from 0 to 13).
procname	specifies the name of a cataloged procedure.
rdr	specifies the name of the reader procedure being started.
route-code	specifies a value which identifies a central console.
term-id	specifies a unique number (1-200) assigned to a remote terminal.
text	specifies information to be entered in response to a message.
unit	specifies the symbolic unit address (for example, PR1) of an I/O device.
unitaddr	specifies the channel and unit address (cuu) of an I/O device.
userid	specifies an assigned sequence of one to seven alphameric characters.
wtr	specifies the name of a writer procedure being started.


SMF
SMFPRMxx parameters
[OPT= {1}]
[{2}]
1-collect system & job info
2-collect system, job, & job step info
[DSV= {0}]
[{1}]
[{2}]
[{3}]
0-no data set or DASD info
1-collect DASD info
2-collect data set info
3-collect data set & DASD info
[REC= {0}]
[{2}]
0-no temporary data set info
2-collect temporary data set info
[EXT= {NO}]
[{YES}]
NO-no exits
YES-take exits
JWT=nnn
nnn-wait state time limit in minutes
[BUF=nnnn]
nnnn-buffer size in bytes (max is 8192)
SID=xxxx
xxxx-system identification
[OPI= {YES}]
[{NO}]
YES-operator allowed to modify parameters
NO-operator not allowed to modify parameters
[MAN= {NONE}]
[{USER}]
[{ALL}]
NONE-no records to SMF data set
USER-only user records to SMF data set (type 128-255)
ALL-all record types to SMF data set

System Operator Commands for CRJE

Operation	Operand
BRDCST	C { nnnn,'text' / 'text' / nnnn / DELETE }

Operation	Operand
CENOUT	C, J=jobname, C=class

Operation	Operands
{ MODIFY / F }	[procname.] identifier, { D / A } = (address,...)

Operation	Operand
MSG	C { M='text' [,U=userid [,Q]] / D=userid }

Operation	Operands
SHOW	C { JOBS [,jobname] / USERS [,userid] / ACTIVE [,NUMBER] / BRDCST / MSGS [,userid] / LERB [,lineaddress] / SESS [,userid] / SESSREL [,userid] }

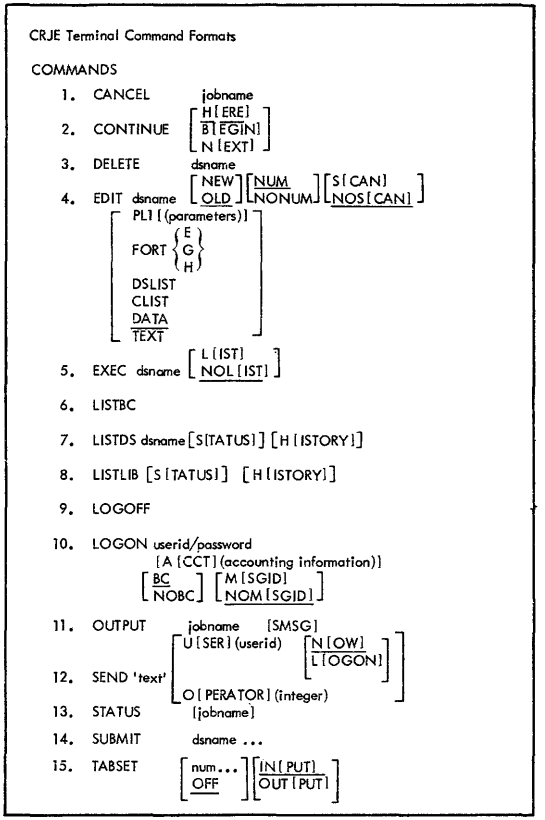
Operation	Operands
{ START / S }	procname.identifier,,,({ FORM / NFMT / NONE } { ,ABNO / ,NORM })

Operation	Operand
{ STOP / P }	[procname,] identifier

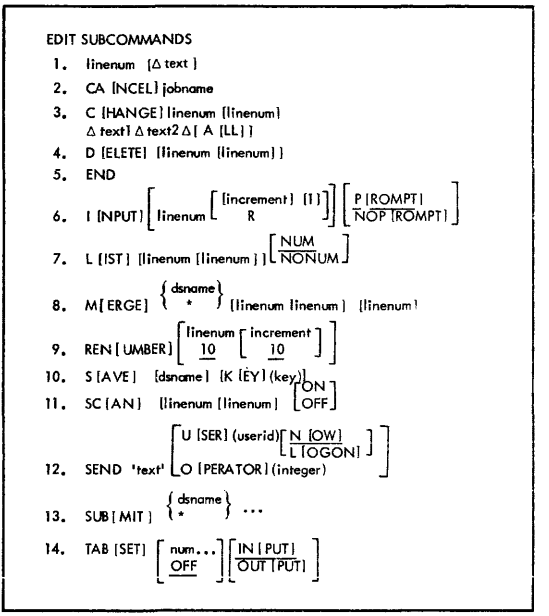
Operation	Operands
USERID	C, { { A [DD] / D [ELETE] } = (userid,password) / S [UPPRESS] / R [ESUME] }

OS/VS CRJE Terminal Command Formats

Source: GC24-5091- OS/VS Programmer's Reference Digest



EDIT Subcommands



SESSION MANAGEMENT COMMANDS

Command	Function
LOGON	To identify the user and initiate his session.
LOGOFF	To terminate a session.

DATA MANAGEMENT COMMANDS

General

Command	Function
DELETE	To scratch an VS data set or to remove a CRJE data set from the user's library.
EDIT	To initiate creating or updating operations.

EDIT Subcommands

Subcommand	Abbreviation	Function
INPUT	I	To insert and/or replace lines in the active set.
DELETE	D	To remove lines in the active data set.
Implicit		To enter or delete lines in the active data set.
CHANGE	C	To replace character strings within lines of the active data set.
MERGE	M	To combine another data set with the active data set or to copy lines from one place to another within the active data set.
RENUMBER	REN	To reassign line numbers to the lines in the active data set.
LIST	L	To display lines of the active data set.
SCAN	SC	To request a syntax analysis of PL/1 or FORTRAN source language statements in the active data set.
SAVE	S	To store the active data set in the user's library.
END		To terminate creating and updating operations and to delete the active data set.

JOB PROCESSING COMMANDS

Command	Function
SUBMIT	To enter a job into the VS job input stream. (Can also be used as an EDIT subcommand; it can be abbreviated SUB when used as a subcommand.)
OUTPUT	To request CRJE SYSOUT output of a conversationally-submitted job.
CONTINUE	To resume output listing that was previously interrupted.
CANCEL	To remove a job from the CRJE system and to delete any CRJE SYSOUT output of that job. (Can be used as an EDIT subcommand; it may also be abbreviated CA when used as a subcommand.)

STATUS INFORMATION COMMANDS

Command	Function
LISTLIB	To obtain the name and characteristics of every CRJE data set in the user's library.

STATUS INFORMATION COMMANDS (cont.)

Command	Function
LISTDS	To obtain information about a particular CRJE data set in the user's library.
STATUS	To obtain information about jobs the user has submitted.

MESSAGE COMMANDS

Command	Function
SEND	To send a message to the central operator or to another terminal user. (Can also be an EDIT subcommand.)
LISTBC	To request the broadcast messages.

TABSET COMMAND

Command	Function
TABSET	To indicate the tab settings at the terminal. This command affects all input and output and can be either a command or an EDIT subcommand. (Can only be abbreviated - TAB - as a subcommand.)

EXEC COMMAND

Command	Function
EXEC	To execute a sequence of commands contained in a CRJE data set.

CRJE INSTALLATION VARIABLES

The following functions, restrictions, and assignments are determined by the central installation when the system is generated.

ADDITIONAL COMMANDS AND SUBCOMMANDS

The installation may add commands and subcommands to the system by providing the routines to process them.

COMMAND ALIASES

The installation may assign alternate verbs (aliases) for the CRJE commands and subcommands. Duplication of aliases is allowed between modes but not within the same mode; i.e., the same alias may be used for a command and a subcommand, but it cannot be used for two commands (if in command mode) nor for two subcommands (if in edit mode). Either the CRJE name or the installation alias is recognized when entered from a terminal.

EXIT ROUTINES

Routines may be provided by the installation to check the accounting information on LOGON commands, to check JCL statements of jobs submitted for batch processing, and to obtain accounting information when a user logs off the system. An installation routine may reject a LOGON command and may terminate a job submission.

SYNTAX CHECKERS

The installation selects what syntax checkers, if any, are provided in the system and the kind of checking performed (i.e., level of checking or language level supported).

NUMBER OF LINES PER SYNTAX SCAN

The installation can impose a limit on the number of lines one statement can span and still be scanned as a complete statement by the syntax checker.

USERID/PASSWORD

The installation assigns userids and passwords to authorized terminal users.

CRJE SYSOUT CLASS

The system output class used for remote job output to be returned to terminal users is assigned by the installation.

NUMBER OF LINES PER OUTPUT GROUP

The installation specifies how many lines of output are sent to terminal before allowing the terminal user to interrupt the output. This only applies to terminals without a special interrupt feature.

MAXIMUM NUMBER OF JOBS

The maximum number of jobs that can reside in the central system at one time is determined by the installation. When this maximum is reached, no more jobs are accepted until some of the existing jobs are cancelled or their output is returned.

MAXIMUM NUMBER OF MESSAGES

The installation determines the number of messages that can be maintained by the system at any one time. This includes messages waiting for delivery at logon time and messages currently being processed.

ROUTING CODES FOR MULTIPLE CONSOLES

If the central system supports multiple consoles, the installation specifies a routing code for each console. A user may direct a message to an operator at a particular console by specifying the routing code for that console.

ON-LINE TERMINAL TEST

The installation determines whether or not the BTAM On-Line Terminal Test facility is provided. This facility provides tests that can be used by the terminal user as a start-up procedure or by the customer engineer for terminal checkout and diagnosis of terminal failure.

Examples of the K Command

Note: The K command is used in conjunction with Models 115 and 125 only.

First Operand	Second Operand	Meaning	Example	Explanation of Example
S	,REF	Display current values of the S-operands	K S,REF*	Assuming that the initialization values are still in effect, K S,DEL=Y,CON=Y, SEG=6 is displayed in the entry area.
S	,DEL=Y	Delete messages automatically	K S,DEL=Y	When the screen is full, all deletable messages are deleted.
S	,DEL=N	Do not delete messages automatically	K S,DEL=N	When the screen is full, use the K command or the cursor to delete messages.
S	,CON=Y	Delete messages after verification	K S,CON=Y	When a deletion command has been entered, you can check the messages before they are deleted.
S	,CON=N	Delete messages immediately	K S,CON=N	When a deletion command has been entered, messages are deleted immediately.
S	,SEG=n	Delete n lines at a time	K SEG=4	When you enter K E,SEG (or just K), lines 1 through 4 are deleted.

* You may also enter K S since REF is the default value of the S operand.

Examples of the K Command (cont'd)

First Operand	Second Operand	Meaning	Example	Explanation of Example
E	,SEG	Delete message lines as specified in S SEG=n	K E,SEG**	Assuming S,SEG=5 was specified, lines 1 through 5 are deleted.
E	,n	Delete line n	K E,4	Message line 4 is deleted.
E	,n,n	Delete the range of lines from n to n	K E,2,6	Lines 2 through 6 are deleted.
E	,N	Delete the line numbers	K E,N	The message line numbers are deleted from the screen.
D	,N	Display line numbers in all message lines	K D,N	All message lines, including continuation lines, are numbered until a K E command is issued.
D	,N,HOLD	Prevents line numbers from being deleted	K D,N,HOLD	All message lines are numbered. Line numbers are erased only by K E,N command.

** You may also enter K since E and SEG are default values.

Examples of the K Command

Note: The D command is used in conjunction with Models 115 and 125 only.

Entering redisplay mode

Command	Meaning
D D L D L,ALL	Enter redisplay mode for all messages
D L,AR	Enter redisplay mode for AR messages only
D L,BG	Enter redisplay mode for BG messages only
D L,Fx	Enter redisplay mode for messages from a specified foreground partition only

Controlling redisplay operation

Command	Meaning
D L,ALL	Redisplay all messages
D L,F2	Redisplay messages from F2 only
D L,F4,R	Reset the screen to the most recent F4 messages
D L,B	Change from forward to backward redisplay
D L,F	Change from backward to forward redisplay
D L,F,240	Space forward 240 lines
D L,B,70	Space backward 70 lines
D L,B	Reset the screen to status when redisplay started
D L,170	Space 170 lines forward or backward, depending on the redisplay direction currently in effect

Terminating redisplay mode

Command	Meaning
D E	Terminate redisplay mode

The CONTROL command (abbreviated K) controls the display console. Each function of this command is described in an appropriate place in the SRL. To request a summary of the CONTROL command operands and the functions that they perform, enter the following commands:

$$\left\{\begin{matrix}\text{DISPLAY}\\ \text{D}\end{matrix}\right\} \quad \text{C,K [,L=} \left\{\begin{matrix}\text{a}\\ \text{cc}\\ \text{cca}\end{matrix}\right\} \quad]$$

C,K specifies that a summary of CONTROL command operands is to be displayed.

$$\text{L=} \left\{\begin{matrix}\text{a}\\ \text{cc}\\ \text{cca}\end{matrix}\right\}$$ specifies the display area (a), console (cc), or both (cca) at which the display is to be presented. If you omit this operand, the display is presented in the first available display area on the console through which you entered the command; (unless routing instructions are in effect).

For example, to display a summary of CONTROL command operands in display area A of console 10, enter:

```
D  C,K,L=10A
```

A printed summary of Control command formats appears in OS/VS2 (JES 2) commands summary which you will find in this section.

PROGRAM FUNCTION KEYS

Entering Commands with the PFKs

The program function keyboard is a group of 12 keys (called PFKs) located on the right side of the operator console keyboard. (It is an optional feature of the model 3277 display console, and is not available for the model 158 display console.) One or more PFKs may be available to you for entering commands. The PFKs are designated for operator command entry by the system programmer during system generation.

Each PFK is defined as conversational or nonconversational. The commands associated with a nonconversational PFK are entered immediately when you press the key. The commands associated with a conversational PFK are presented in the entry area, one at a time, when you press the key. You may make changes to them before you enter them.

In place of keys, the Mod 158 Display Console provides a PFK line (above the instruction line) and entering of commands by light pen.

How to Display the PFK Numbers

Use the following form of the CONTROL command to display and erase the numbers in the PFK display line:

$$\left\{\begin{matrix}\text{CONTROL}\\ \text{K}\end{matrix}\right\} \quad \left\{\begin{matrix}\text{D PFK}\\ \text{E PFK}\end{matrix}\right\}$$

D,PFK specifies that the numbers of the PFKs designated for command entry are to be displayed in the PFK display line.

E,PFK specifies that the numbers are to be erased from the PFK display line.

Example: To request display in the PFK display line (this line is located immediately above the instruction line), enter:

```
K  D  PFK
```

1. Press POWER ON and wait until PROGRAM LOAD appears on the screen.
2. Mount the SYSRES disk pack on a disk drive and ready this device.
3. Mount the pack containing the page data set on the disk drive assigned to SYSVIS. (If the standard assignment for SYSVIS does not exist or is not to be used, any disk drive can be chosen for the pack; the physical address of the drive must then be specified in the DPD command.)
4. Type in the physical device address of the disk drive that holds the SYSRES disk pack. Type in the character C and press ENTER.
5. When WAIT appears on the screen, press REQUEST. This displays the following message:

   0I03A SPECIFY SUPERVISOR NAME

   If you wish to use the default supervisor ($$A$SUP1), press ENTER; otherwise, enter the name of the required supervisor and then press ENTER.
6. When WAIT appears on the screen again, press REQUEST. This displays one of the following sets of messages:

   A. 0I30I DATE=date,CLOCK=time,ZONE=difference
      0I10A GIVE IPL COMMANDS

   B. 0I31A DATE REQUIRED, CLOCK REQUIRED,
      ZONE=difference
      0I10A GIVE IPL COMMANDS

   C. 0I32I TOD CLOCK INOPERATIVE; NO TOD SUPPORT
      0I31A DATE REQUIRED, CLOCK REQUIRED
      0I10A GIVE IPL COMMANDS

7. Depending on the messages that were printed on SYSLOG (see step 6), take the following action:

   A. 1. If all values are satisfactory, enter the SET command without parameters.
      2. If the date or time of day is not satisfactory, enter the SET command with both DATE and CLOCK parameters, and press ENABLE SET.
      3. If the zone is not satisfactory, enter the SET command with the ZONE parameter.
      4. If none of the values is satisfactory, enter the SET command with all parameters and press ENABLE SET.

   B. 1. If the zone value is satisfactory, enter the SET command with DATE and CLOCK parameters, and press ENABLE SET.
      2. If the zone value is not satisfactory, enter the SET command with all parameters and press ENABLE SET.

   C. Enter the SET command with DATE and CLOCK parameters and press ENABLE SET.

8. Enter the CAT command, if required, to indicate on which physical device the disk pack containing the VSAM catalog is mounted.

9. Enter the DPD command to define the page data set. DPD is mandatory; all operands are optional.

10. Press ENTER. The system then issues the message

    DOS/VS IPL COMPLETE

    in which case you can go to steps 11, 12, and 13, or it issues the messages

    DOS/VS IPL COMPLETE
    1100A WARM START COPY OF SVA FOUND

    There are three possible responses:

    A. Enter KEEP, if you wish to keep the current copy of the SVA (Shared Virtual Area); in this case, steps 11, 12, and 13 cannot be executed.

    B. Press ENTER. This has the same effect as A, above.

    C. Enter REJ, if you do not wish to keep the current copy of the SVA; in this case you can go to steps 11, 12, and 13.

11. If the SVA option was not specified during system generation, or if you wish to change the size of the existing SVA, enter the SET SVA=(nK,nK) job control command.

12. If you wish to create a system directory list (SDL), specify the SET SDL=CREATE job control command, followed by a list of the phase names to be included in the SDL.

    If you wish to use the IBM supplied SDL, enter the command EXEC PROC=SDL.

13. If you wish to create an SVA and SDL for the VSAM modules and include your VSAM modules in this SVA specify:

    EXEC PROC=IKQVPSVA

IPL Procedure VS1

Sources: GC38-1001 VS1 Release 2 System Messages
GC38-0110 Operator's Library OS/VS1 Reference

Shown below are a few sample replies to system messages received during initialization. For complete information consult System Messages. According to your system control program, the messages you receive may have different id's from the ones shown here. Reply, using the id fitting your message.

To start IPL, dial or enter address of SYSRES volume and press LOAD button.

IEA706A SPECIFY VIRTUAL STORAGE SIZE

Press END key or reply r 0, 'u' (for default); or reply r 0, 'ddddd' where ddddd is the number of K bytes for virtual storage.

IEA101A SPECIFY SYSTEM AND/OR SET PARAMETERS FOR RELEASE 02.0 OS/VS1

Press END key or reply r 0, 'u' to indicate no change in parameters;

r 0, 'u,L' to indicate system should use system generation values for all parameters and should print all lists;
r 0,'prm-,' to cancel a parameter for this loading which was specified during system generation;
r 0,'prm=val' to indicate the value of this parameter for this loading;
r 0,'prm=val,L' to specify the value for the parameter and to request a list of all modules;
r 0,'date=yy.ddd,clock=hh.mm.ss' to reset date and/or local time;
r 0,'data=yy.ddd,clock=hh.mm.ss,gmt' to change date and/or GMT clock. After you set the clock, press TOD CLK ENABLE switch before pressing END key.

IEA135A SPECIFY SYS1.DUMP TAPE UNIT ADDRESS OR NO

Press END key or reply r 0,'no' if a SYS1.DUMP data set will not be used; or r 0,'ddd' where ddd is the 2400/3400 series tape device to be used for the SYS1.DUMP data set.

*00 IEE801D CHANGE PARTITIONS – REPLY YES/NO (,LIST)
(Quotes around text are optional from here on.)

Reply r 0,no to indicate partitions are not to be defined;
r 0,yes partitions are to be redefined;
r 0,list only a list of partitions is wanted;
r 0,yes,list partitions are to be redefined and a list is wanted.

*01 IEE114A SPECIFY SET PARAMETERS OR U

Reply r 1,u for no set parameters;
r 1,proc= for specifying a proc;
r 1,q=(,f) for formatting the queue;
r 1,spool=(chng,f) for changing spool;
or any combination of these. DATE, CLOCK, and GMT are not valid at this time.

*02 IFB010D ENTER 'IPL REASON, SUBSYSTEM ID' or 'U'

Reply r 2,u to continue operation with default values; or
r 2,'rr,ss' where rr is the RDE IPL reason code and ss is the subsystem ID code.

IPL Reason Code		Subsystem ID Code	
NM	Normal	00	Null
IE	IBM hardware/programming problem, CE/SE not required	10	Processor
		20	Direct Access
ME	Media	30	Other
UN	Unknown	40	Tape
OP	Operational	50	Card/Print
UP	User Program	60	MICR/OCR
EN	Environmental	70	Teleprocessing
CE	CE/SE has the system	80	Graphics/Display/Audio
		90	IBM System Control Program
SOURCE: GC28-0638		91	IBM Programming Product

*03 IEE357A REPLY WITH SMF VALUES OR U

Reply r 3,u no change in parameters;
r 3,keyword=value for change to SMF parameters.

IEE048I INITIALIZATION COMPLETED.

IPL Procedure VS2

Sources: GC38-1002 VS2 Release 1.6 System Messages
GC38-0210 Operator's Library OS/VS2 Reference

Shown below are a few sample replies to system messages received during initialization. For complete information consult System Messages. According to your system control program, the messages you receive may show different id's from the ones shown here. Reply, using the id appropriate to your message.

To start IPL, dial or enter address of SYSRES volume and press LOAD key.

IEA101A SPECIFY SYSTEM PARAMETERS FOR RELEASE 01.6 VS2

Press END key or reply r 0,u for default (the system will use the default system parameters in SYS1.PARMLIB); or
r 0,u,L default and a list of system parameters;
r 0,parm=, to cancel the parameter for this IPL which was specified during system generation;
r 0,parm=val,L to specify the value for the parameter and request a list of system parameters.

IEA332A SPECIFY DUMP OR CANCEL

Press END key to cancel or reply r 0,DUMP parm (if function is used).

*IEE114A DATE=73.323,CLOCK=11.08.52
*00 IEE114A DATE=73.323,CLOCK=16.08.52.GMT REPLY WITH SET PARM OR U

Reply r 0,u if date and time are correct and there are no set parameters;
r 0,proc= (specify proc or r 0,auto=nnn (to override auto commands--n for no, y for yes) or r 0,q=(252,f) to format the queue; or any combination of these. Do not press the TOD CLK ENABLE switch.
Reply r 0,data=yy.ddd,clock=hh.mm.ss,gmt to change date and/or GMT clock.
After you set clock, depress TOD CLK ENABLE switch before pressing END key.

*01 IFB010D ENTER 'IPL REASON, SUBSYSTEM ID' OR 'U'

Reply r 1,u to continue operation with default values; or
r 1,rr,ss where rr is the RDE IPL Reason Code and ss is the Subsystem ID code.

IPL Reason Code		Subsystem ID Code	
NM	Normal	00	Null
IE	IBM hardware/programming problem, CE/SE not required	10	Processor
		20	Direct Access
ME	Media	30	Other
UN	Unknown	40	Tape
OP	Operational	50	Card/Print
UP	User Program	60	MICR/OCR
EN	Environmental	70	Teleprocessing
CE	CE/SE has the system	80	Graphics/Display/Audio
		90	IBM System Control Program
SOURCE: GC28-0638		91	Programming Product

*02 IEE357A REPLY WITH SMF VALUES OR U

Reply r 2,u (for default) or r 2,keyword=value where keyword is an SMF parameter specified by your system programmer.

Sample IPL VS2 Release 2

```
 IEA887A CPU 01 LCL DATE=74.008,CLOCK=01.27.24

 IEA887A CPU 00 LCL DATE=74.008,CLOCK=01.29.30
*00 IEA887A TOD CLOCKS MUST BE SET, OR SELECT ADDRESS
r 0,addr=0
 IEE600I REPLY TO 00 IS;ADDR=0
 IEE3061 RPLY HAS INVALID NUMERICS
 IEA887A CPU 01 LCL DATE=74.008,CLOCK=01.27.50
 IEA887A CPU 00 LCL DATE=74.008,CLOCK=01.29.56
*01 IEA887A TOD CLOCKS MUST BE SET, OR SELECT ADDRESS
r 1,addr=00
 IEE600I REPLY TO 01 IS;ADDR=00
 IEA888A GMT DATE=74.008,CLOCK=06.30.15
*02 IEA888A  LCL  DATE=74.008,CLOCK=01.30.15 REPLY U, OR GMT, OR LCL
    TIME
r 2,u
*03 IEA889A DEPRESS TOD CLOCK SECURITY SWITCH
 IEE600I REPLY TO 02 IS;U
r 3,u
 IEE600I REPLY TO 03 IS;U

IEF165I // START JES2      (This message would follow)
```

Section 5 Contents

Status Byte

Source: Component Description SRL for each device

	NOT USED	DE	DEVICE END
ATTN	ATTENTION	SM	STATUS MO
CE	CHANNEL END	UC	UNIT CHECK
CUE	CONTROL UNIT END	UE	UNIT EXCEPTION

BIT / DEVICE	0	1	2	3	4	5	6	7
1403				BUSY	CE	DE	UC	UE
2301 (2820)		SM	CUE	BUSY	CE	DE	UC	UE
2303	ATTN	SM	CUE	BUSY	CE	DE	UC	UE
2305(2835)	ATTN	SM	CUE	BUSY	CE	DE	UC	UE
2319		SM	CUE	BUSY	CE	DE	UC	UE
2400		SM	CUE	BUSY	CE	DE	UC	UE
2560				BUSY	CE	DE	UC	UE
2596				BUSY	CE	DE	UC	UE
2701	ATTN	SM		BUSY	CE	DE	UC	UE
2702		SM	CUE	BUSY	CE	DE	UC	UE
2703		SM	CUE	BUSY	CE	DE	UC	UE
2821				BUSY	CE	DE	UC	UE
3203				BUSY	CE	DE	UC	UE
3210	ATTN	SM		BUSY	CE	DE	UC	UE
3211				BUSY	CE	DE	UC	UE
3215	ATTN			BUSY	CE	DE	UC	UE
3270	ATTN	SM	CUE	BUSY	CE	DE	UC	UE
3277	ATTN			BUSY	CE	DE	UC	
3330		SM		BUSY	CE	DE	UC	UE
3340		SM	CUE	BUSY	CE	DE	UC	UE
3410			CUE	BUSY	CE	DE	UC	UE
3411			CUE	BUSY	CE	DE	UC	UE
3420(3803)		SM	CUE	BUSY	CE	DE	UC	UE
3504				BUSY	CE	DE	UC	UE
3525				BUSY	CE	DE	UC	UE
3540				BUSY	CE	DE	UC	
3704	ATTN	SM	CUE	BUSY	CE	DE	UC	UE
3705	ATTN	SM	CUE	BUSY	CE	DE	UC	UE
5203				BUSY	CE	DE	UC	UE
5213	ATTN	SM	CUE	BUSY	CE	DE	UC	UE
5425				BUSY	CE	DE	UC	UE

Sense Bytes

Sources: SY33-8571 DOS/VS Handbook, Release 29
GA22-6895 (2301 only)... GA26-5988 (2303 only)...
GA26-1589 (2305 only)... GA33-1506 (3203 only)...
GA21-9167 (5425 only)

Sense

Byte 0

BIT / DEVICE	0	1	2	3	4	5	6	7
1017	CMD REJ	INT REQ	BUS OUT		DATA CHK			BRKN TAPE
1018	CMD REJ	INT REQ	BUS OUT	EQ CHK	DATA CHK			
1287	CMD REJ	INT REQ	BUS OUT	EQ CHK	DATA CHK	OVER-RUN	NON RCVY	KYBD CORR
1288	CMD REJ	INT REQ	BUS OUT	EQ CHK	DATA CHK	OVER-RUN	NON RCVY	
1403 1443	CMD REJ	INT REQ	BUS OUT	EQ CHK	DATA CHK TYPE BAR	STR PTY ERR TYPE BAR		CH9
1442, 2501, 2520, 2596	CMD REJ	INT REQ	BUS OUT	EQ CHK	DATA CHK	OVER-RUN		
1419 PCU	CMD REJ	INT REQ	BUS OUT		DATA CHK	OVER-RUN	AUTO SELECT	
1419 SCU	CMD REJ	INT REQ	BUS OUT		DATA CHK	OVER-RUN	AUTO SELECT	
2260	CMD REJ	INT REQ	BUS OUT	EQ CHK				
2301/2820	CMD REJ	INT REQ	BUS OUT	EQ CHK	DATA CHK	OVER-RUN		
2305	CMD REJ	INT REQ	BUS OUT	EQ CHK	DATA CHK	OVER-RUN		
2311, 2321	CMD REJ	INT REQ	BUS OUT	EQ CHK	DATA CHK	OVER-RUN	TRK COND CHK	SEEK CHK
2314, 2319	CMD REJ	INT REQ	BUS OUT	EQ CHK	DATA CHK	OVER-RUN	TRK COND CHK	SEEK CHK
2400	CMD REJ	INT REQ	BUS OUT	EQ CHK	DATA CHK	OVER-RUN	WRT CNT ZERO	DATA CNVT CHK
2495	CMD REJ	INT REQ	BUS OUT	EQ CHK	DATA CHK	SHOULD NOT OCCUR	POSN CHK	SHOULD NOT OCCUR
2540	CMD REJ	INT REQ	BUS OUT	EQ CHK	DATA CHK		UN-USUAL CMD	
2560	CMD REJ	INT REQ		EQ CHK	DATA CHK	FEED/MACH CHK		NO CRD AVAIL
2671, 2822	CMD REJ	INT REQ	BUS OUT	EQ CHK	DATA CHK			
3203	CMD REJ	INT REQ		EQ CHK	DATA CHK	CHAIN BUF PARITY CHK	NO CHANNEL FOUND	CHANNEL 9
3210, 3215	CMD REJ	INT REQ		EQ CHK				
3211	CMD REJ	INT REQ	BUS OUT	EQ CHK	DATA CHK	BUFFER PARITY CHK	LOAD CHK	CH9
3330	CMD REJ	INT REQ	BUS OUT	EQ CHK	DATA CHK	OVER-RUN		
3340	CMD REJ	INT REQ	BUS OUT	EQ CHK	DATA CHK	OVER-RUN		
3410, 3411	CMD REJ	INT REQ	BUS OUT	EQ CHK	DATA CHK	OVER-RUN	WRT CNT ZERO	DATA CNVT CHK
3420, 3803	CMD REJ	INT REQ	BUS OUT	EQ CHK	DATA CHK	OVER-RUN	WORD COUNT ZERO	DATA CNVT CHK
3504, 3505, 3525	CMD REJ	INT REQ	BUS OUT	EQ CHK	DATA CHK		ABN FORMAT RESET	PERM ERR (by-pass key)
3540	CMD REJ	INT REQ	BUS OUT	EQ CHK	DATA CHK			
3881	CMD	INT	BUS	EQ			UN-USUAL CMD SQ	
3886	CMD REJ	INT REQ	BUS OUT	EQ CHK			NON-INIT	RCP ERR
5425	CMD REJ	INT REQ	BUS OUT	EQ CHK	DATA CHK		NO CARD AVAILABLE	

Sense (cont'd)

Byte 1

BIT / DEVICE	0	1	2	3	4	5	6	7
1287	TAPE MODE	LATE STKR SELECT	NO DOC FOUND		INVAL OP			
1288		END OF PAGE	NO DOC FOUND		INVAL OP			
1419 SCU	FLD 6 VALID	FLD 7 VALID	DOC UNDER W HD	AMT FLD VALID	PRO CTL FLD VALID	ACCT# FLD VALID	TRANSIT FLD VALID	SER# FLD VALID
2260								
2301/2820	DATA CHK IN COUNT	TRK OVER-RUN	END OF CYL	INVAL SEQ	NO REC FOUND	FILE PROT	SVC OVER-RUN	OVER-FLOW INC
2305	PERM ERROR	INVAL TRK FORMAT	END OF CYCLE		NO REC FOUND	FILE PROT		OPER-ATION INC
2311, 2321	DATA CHK IN COUNT	TRK OVER-RUN	END OF CYL	INVAL SEQ	NO REC FOUND	FILE PROT	MISSING ADDR MARKER	OVER-FLOW INC
2314, 2319	DATA CHK IN COUNT	TRK OVER-FLOW	END OF CYL	INVAL SEQ	NO REC FOUND	FILE PROT	SERVICE OVER-RUN	OVER-FLOW INC
2400	NOISE	00-NON-XST TU 01-NOT READY 10-RDY&NO RWD 11-RDY & RWD		7 TRK	AT LOAD POINT	WRT STATUS	FILE PROT	TAPE IND
2560	COVER INT LCK	JAM BAR CHK	CORNER ST'N CHK	CELL 8/9 FDCHK	PRINT ST'N FDCHK	PUNCH ST'N FDCHK	READ ST'N FDCHK	INPUT ST'N FDCHK
3203	NOT USED							
3211	CMD RETRY	PRINT CHK	PRINT QUALITY	LINE POS	FORMS CHK	CMD SUP	MECHAN ICAL MOTION	
3330	PERM ERR	INVLD TRK FORMAT	END OF CYL		NO REC FOUND	FILE PROT	WRITE INHIBIT	OPER-ATION INC
3340	PERM ERR	INVLD TRK FORMAT	END OF CYL		NO REC FOUND	FILE PROT	WRITE INHIBIT	OPER-ATION INC
3410, 3411	NOISE	TU STAT A	TU STAT B	7 TRK	AT LOAD POINT	WRT STATUS	FILE PROT	NOT CAPA-BLE
3420, 2803	NOISE	TU STAT A	TU STAT B	7 TRK	AT LOAD POINT	WRT STATUS	FILE PROT	NOT CAPA-BLE
3504, 3505, 3525	PERM ERR	AUTO RETRY	MOTION MAL FUN	RETRY AFTER INT REQ COMPL				
3540	PERM ERR	AUTO RETRY	MOTION MAL FUN	RETRY AFTER INT REQ COMPL	SPEC RCRD XFRD			
3886		MARK CHK	INVLD FOR-MAT		SCAN INC		NON RCVY	OUT BRD
5425	READ CHK	PUNCH CHK		PRINT DATA CHK	PRINT CLUTCH CHK	HOP-PER CHK	FEED CHK	

Sense (cont'd)

Byte 2

BIT / DEVICE	0	1	2	3	4	5	6	7
2260		BUFFER ADDRESS REGISTER BIT 15	BIT 14	BIT 13	BIT 12	BIT 11	BIT 10	BIT 9
2301/ 2820	UN-SAFE	SHIFT REG LOCK	SKEW	COUN-TER CHK	COMP CHK			
2305	BUF LOG FULL	COR-RECT-ABLE						
2311, 2321	UN-SAFE		SER/ DESER		ALU CHK	UNSEL STATUS		
2314, 2319	UN-SAFE		SER/ DESER	TAG LINE	ALU CHK	UNSEL STATUS		
2400	BITS 0-7 INDICATE A TRACK IS IN ERROR						6 & 7 INDICATE NO ERROR OR MULTI-ERROR	
3203	INTER-LOCK	FORM CHK	COIL PROT CHK	SUBSCAN RING CHK	CHAIN BUF ADDR REG CHK	HAMMER UNIT SHIFT CHK	ANY-HAMMER ON CHK	DEVICE READY CHK
2311, 2321	UN-SAFE		SER/ DESER		ALU CHK	UNSEL STATUS		
2314, 2319	UN-SAFE		SER/ DESER	TAG LINE	ALU CHK	UNSEL STATUS		
2400	BITS 0-7 INDICATE A TRACK IS IN ERROR						6 & 7 INDICATE NO ERROR OR MULTI-ERROR	
3211	CARR FAILED TO MOVE	CARR SEQ	CARR STOP	PLATEN FAILED	PLATEN FAILED	FORMS JAM	RIBBON MO-TION	TRAIN OVER-LOAD
3330		COR-RECT ABLE		ENV DATA PRESENT				
3340		COR-RECT ABLE		ENV DATA PRESENT				
3410, 3411	TRACK IN ERROR BITS							
3420, 3803	TRACK IN ERROR BITS							
3504/5, 3525	USED FOR DIAGNOSTIC PURPOSES ONLY							
3540	USED FOR DIAGNOSTIC PURPOSES ONLY							
5425			CARD IN PRIMARY	CARD IN SECON-DARY		HOPPER CYCLE INC	CARD IN TRANS-PORT BIT 2	CARD IN TRANS-PORT BIT 1

Sense (cont'd)

Byte 3

BIT / DEVICE	0	1	2	3	4	5	6	7
2260	BUFFER ADDRESS REGISTER							
	BIT 8	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1
2301/ 2820	LONG REDUND CHK							
2305	RESTART COMMAND							
2311	READY	ON LINE	UN-SAFE		ON LINE	END OF CYL		SEEK INC
2314	BUSY	ON LINE	UN-SAFE	WR CUR CEN	PACK CHNG	END OF CYL	M-MODE SE	SEEK INC
2319	LRC BIT 0	LRC BIT 1	LRC BIT 2	LRC BIT3				
2321	DRIVE READY	DRIVE OPER	READ SAFETY	WRITE SAFETY	STRIP READY	INVLD ADDR	AUTO REST	CE CELL LOC
3205			CAR-RAGE INHIBIT CHK				STEP CHK	MOVE CHK
2400	R/W VRC	LRCR	SKEW	CRC	SKEW REQ	0-1600 1-800	BKWD STATUS	COM-PARE
3211	UCSB PARITY	PLB PARITY	FCB PARITY	COIL PROT CHK	HAM-MER FIRE	FIELD ENG	USCAR SYNC CHK	SEP SYNC CHK
3330	RESTART COMMAND							
3340	RESTART COMMAND							
3410, 3411	VRC	MTE/ LRCR	SKEW	END DATA CHK/CRC	ENV CHK	1600 BPI IN TU	BKWD	
3420 3803	R/W VRC	MTE/ LRC	SKEW	END DATA CHK/CRC	VRC/ ENV CHK	1600 BPI	BKWD	COM-PARE
3504/5, 3525	USED FOR DIAGNOSTIC PURPOSES ONLY							
3540	CYLINDER ADDRESS IN BINARY							
5425	FEED AND EMITTER CHECKS (HEX NO)							

Sense (cont'd)

Byte 4

BIT / DEVICE	0	1	2	3	4	5	6	7
2260								
2301/2820	SEQ IND	SEQ IND	SEQ IND	SEQ IND	SEQ IND	SEQ IND	SEQ IND	SEQ IND
2305	UNUSED							
2311, 2321								
2314					PHYSICAL DRIVE IDENTIFICATION			
2319	SEQ IND 0	SEQ IND 1	SEQ IND 2	SEQ IND 3	SEQ IND 4	SEQ IND 5	SEQ IND 6	SEQ IND 7
2400	ECHO ERR	RES TAPE UNIT	READ CLOCK ERR	WRITE CLOCK ERR	DELAY CNTR	SEQ IND C	SEQ IND B	SEQ IND A
3203	HAM-MER RE-SET FAIL-URE CHK	NO FIRE CHK	MIS-FIRE CHK	PRINT DATA BUF PARITY CHK	CHK BIT BUF PARITY CHK	CHAIN BUF PARITY CHK	BUF ADDR REG CHK	CLOCK CHK
3211								
3330	STORAGE CONTROL ID		PHYSICAL DRIVE ID G=001110 E=011100 C=101010 A=111000 H=000111 F=010101 D=100011 B=110001					
3340	STORAGE CONTROL ID		PHYSICAL DRIVE ID G=001110 E=011100 C=101010 A=111000 H=000111 F=010101 D=100011 B=110001					
3410, 3411	TU POSIT CHK	TAPE IND				DIAG TRK CHK	TU CHK	ILLEGAL CMD
3420, 3803	ALU HDWR ERROR	REJ TAPE UNIT	TAPE INDI-CATE	WRITE TRGGR VRC	MICRO-PGM DET ERROR	LWR ERROR	TAPE UNIT CHK	RES RPQ
3540	HEAD ADDRESS , MUST BE BINARY ZERO							
5425	DEFINES CARD COLUMN GROUP AND TIER OF ERROR							

Sense (cont'd)

Byte 5

BIT / DEVICE	0	1	2	3	4	5	6	7
2260								
2301/2820								
2305	[DRIVE SEEK ADDRESS]							
2311, 2321	COMMAND IN PROGRESS WHEN OVERFLOW INCOMPLETE OCCURS							
2314	COMMAND IN PROGRESS WHEN OVERFLOW INCOMPLETE OCCURS							
2319								
2400	COMMAND IN PROGRESS WHEN OVERFLOW INC OCCURS OR ZERO							
3203	OPEN COIL CHK							
3211								
3330	CYLINDER ADDRESS							
3340	CYLINDER ADDRESS							
3410, 3411	NEW SUB-SYSTEM		WRT TM CHK	PE ID BURST	PRTY COMP	TACH CHK	FALSE END MARK	RPQ
3420, 3803	NEW SUB-SYSTEM	NEW SUB-SYSTEM	WRT TM CHK	PE ID BURST	START READ CHK	PARTIAL RECORD OR TM	XCESSVE PSTAMBL	RES RPQ
3540	RECORD ADDRESS IN BINARY							
5425	SPECIFIES ROW (S) FOR THE TIER OF ERROR							

Byte 6

BIT / DEVICE	0	1	2	3	4	5	6	7
2301/2820								
2305	[DRIVE SEEK ADDRESS]							
3203								
3330	REVERSE	CYL HIGH	DIFFER HIGH	HEAD ADDRESS				
3340		CYL HIGH		HEAD ADDRESS				
3410, 3411	7 TRK	SHRT GAP	DUAL DENSITY	ALT DENSITY	TAPE UNIT MODEL			
3420, 3803	7 TRK	WRT	DUAL	NRZI	TAPE UNIT MODEL DEFINED			
5425								

Byte 7

BIT / DEVICE	0	1	2	3	4	5	6	7
2301/2820								
2305	[MESSAGE CODE (HEX)]							
3330*	FORMAT TYPE OF REMAINING SENSE BYTES (8-23)				ENCODED ERROR MESSAGE			
3340*	FORMAT TYPE OF REMAINING SENSE BYTES (8-23)				ENCODED ERROR MESSAGE			
3410, 3411	LAMP CHK	LEFT COL CHK	RT COL CHK	READY RESET	DATA SEC ERASE			
3420, 3803	LAMP FAIL	TAPE BOTTOM LEFT	TAPE BOTTOM RIGHT	RESET KEY	DATA SCRTY ERASE	ERASE HEAD FAILED	AIR BRNG PRESS	LOAD FAIL
5425								

Sense (cont'd)

Byte 8

BIT / DEVICE	0	1	2	3	4	5	6	7
3330 *								
3340 *								
3410, 3411		FEED THRU		END VEL CHK	RD BK DATA NOT DET	START VEL CHK		
3420, 3803	IRG DROP IN WRT	FEED THRU CHK	SDR CNTR	EARLY BGN RD BK CHK	EARLY END RD BK CHK	SLOW BGN RD BK CHK	SLOW END RD BK CHK	VELOC RETRY/ RESTRT

Byte 9

BIT / DEVICE	0	1	2	3	4	5	6	7
3420, 3803	JDR CNTR	VLCTY CHNG ON WRT	SDR COUNTERS					TAPE CTL RESD

Byte 10

BIT / DEVICE	0	1	2	3	4	5	6	7
3420, 3803	CMD STATUS REJ		CNTRL STATUS REJ	NO BLK ON RCD RD BKCK	WTM NOT DETECT	TACH START FAIL		VELO-CITY CHK

Byte 11

BIT / DEVICE	0	1	2	3	4	5	6	7
3420, 3803	B BUS PARITY ALU 1		LO ROS/ LO IC PARITY	HI IC BR COND /HI ROS	MCPGM DET HDWR ERR	D BUS PARITY ALU 1		BR COND ALU 1

Byte 12

BIT / DEVICE	0	1	2	3	4	5	6	7
3420, 3803	B BUS PAR ERR ALU 2		LO ROS /LO IC ON BR	HI IC BR/HI ROS REG	MCPGM DETECT HDWR ERR	D BUS PARITY ALU 2		BR COND ALU 2

* 3330/3340 Bytes 8 - 23: Meaning depends on format type.

CARD READERS – GENERAL HINTS

1. A common cause of read checks is off-punched or worn cards.
2. Use a card gauge to determine off punching.
3. A validity check usually indicates a double punch in rows 1–7 of the card.
4. When bringing new cards into the computer room from a different environment (heat, humidity), do not use them for the first 12 hours.
5. Cards do wear out. Reproduce master decks when you notice excessive marking or scoring on the edges.
6. Some common sense messages that may type out on the console are:

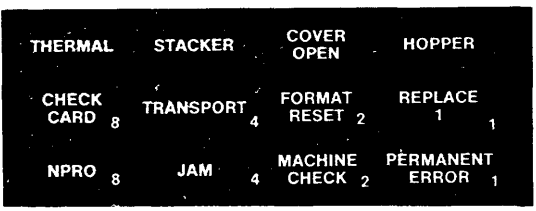
   Intervention Required – Operator attention is needed to empty the stacker, fill the hopper, press END OF FILE, clear the transport, close a cover, or restore ready status. This indication also accompanies a read station failure that occurs during reading.

   Equipment Check – Indicates that the two readings of a column did not agree. Also indicates that the read station failed before reading begins.

   Data Check – Indicates that the machine has detected an invalid card column (more than one punch in rows 1–7) in data mode 1.

3504/3505 Stop Indications and Restart Procedures

Source: GA21-9124-3 3505 Card Reader 3525 Card Punch Subsystem Component Description



If indicators are not in a combination shown on any error display, or if an operator recovery action is unsuccessful, treat the condition as a permanent error and perform the procedure specified by the source program.

INDICATION DISPLAYED: **NPRO**

RECOVERY PROCEDURE:

Recover is likely.

1. NPRO. (Open the hopper door and press the NPRO key.)
2. Place the last 2 cards that entered the active side of stacker 1 in correct sequence under the cards in the hopper and close the hopper door.
3. Press the start key.

NOTE: The permanent error key is operative during this stop.

INDICATION DISPLAYED: **NPRO, MACHINE CHECK**

RECOVERY PROCEDURE:

Recovery is possible. If desired, perform the procedure specified for the NPRO indication two or three times.

Perform the NPRO indication procedure, or if that procedure fails repeatedly:

1. If the reader has a log-out key, press it and write down the digits on each row of the backlighted panel.
2. If the reader has no log-out key, record the error information from the reader log display at the system console.
3. When you report the problem to the CE, also report the error information you recorded.

NOTE: The permanent error key is operative during this stop.

INDICATION DISPLAYED: **NPRO, CHECK CARD**

RECOVERY PROCEDURE:

1. NPRO. (Open the hopper door and press the NPRO key.)
2. Remove the last two cards that entered the active side of stacker 1. The first card stacked is in error; check this card for more than one punch in row positions 1 through 7 in each column and for poor punch registration. (If necessary, replace the card with a card punched correctly offline.) Place the two cards in correct sequence under the cards in the hopper and close the hopper door.
3. Press the start key.

Note: The permanent error key is operative during this stop.

INDICATION DISPLAYED: **NPRO, HOPPER, REPLACE 1**

RECOVERY PROCEDURE:

Recovery is likely.

1. NPRO. (Open the hopper door and press the NPRO key.)
2. Place the last card that entered the active side of stacker 1 back into the hopper, then close the hopper door.
3. Press the start key and the end-of-file key.

NOTE: The permanent error key is operative during this stop.

INDICATION DISPLAYED: **NPRO, HOPPER, REPLACE 1, MACHINE CHECK**

RECOVERY PROCEDURE:

Recovery is possible. If desired, perform the NPRO and REPLACE 1 procedure two or three times. If you do not perform that procedure, or if that procedure fails repeatedly:

1. If the reader has a log-out key, press it and write down the digits on each row of the backlighted panel.
2. If the reader has no log-out key, record the error information from the reader log display at the system console.
3. When you report the problem to the CE, also report the error information you recorded.

Note: The permanent error key is operative during this stop.

INDICATION DISPLAYED: **NPRO, CHECK CARD, REPLACE 1**

RECOVERY PROCEDURE:

1. Remove the cards from the hopper and examine the bottom card for anything that may have caused the misfeed (a burred edge, for example). Reproduce this card, if necessary.
2. Press NPRO key.
3. Place the last card that entered the active side of stacker 1 in correct sequence with the card from 1 above and place them under the cards removed from the hopper.
4. Put the cards back into the hopper and close the hopper door.
5. Press the start key.

INDICATION DISPLAYED: **NPRO, CHECK CARD, HOPPER, REPLACE 1**

RECOVERY PROCEDURE:

1. NPRO. (Open the hopper door and press the NPRO key.)
2. Remove the last card that entered the active side of stacker 1. Check this card for more than one punch in row positions 1 through 7 in each column and for poor punch registration. (If necessary, replace the card with a card punched correctly offline.) Place the card back in the hopper and close the hopper door.
3. Press the end-of-file and start keys.

NOTE: The permanent error key is operative during this stop.

INDICATION DISPLAYED: **HOPPER**

RECOVERY PROCEDURE:

Except for end-of-file conditions:

1. Fill the hopper and close the hopper door.
2. Press the start key.

For end-of-file:

1. Press the end of file key.
2. Press the start key.

NOTE: The permanent error key is operative during this stop.

INDICATION DISPLAYED: **STACKER**

RECOVERY PROCEDURE:

1. Empty the full stacker or set stacker 1 switch to point to empty stacker.
2. Press the start key.

NOTE: The permanent error key is operative during this stop.

INDICATION DISPLAYED: **COVER OPEN**

RECOVERY PROCEDURE:

1. Close all covers.
2. Check last card in stacker area to see that it was completely stacked.
3. Press the start key.

NOTE: The permanent error key is operative during this stop.

INDICATION DISPLAYED: **THERMAL**

RECOVERY PROCEDURE:

The read lamp has overheated.

1. NPRO. (Open the hopper door and press the NPRO key.)
2. Place last 2 cards that entered the active side of stacker 1 in correct sequence under the cards in the hopper and close the hopper door.
3. Press the start key. If the read lamp has cooled enough, the thermal light will turn off.
4. If the thermal light remains on, allow the lamp to cool for a while, then press the start key again. Repeat this step until the light remains off.
5. Press the start key.
6. If the thermal condition is persistent, call a Customer Engineer.

NOTE: The permanent error key is operative during this stop.

INDICATION DISPLAYED: **HOPPER, JAM**

RECOVERY PROCEDURE:

1. Remove cards from hopper, repair or replace any damaged cards, and place the removed cards in correct sequence back into the hopper and close the hopper door.
2. Press the start key.

NOTE: The permanent error key is operative during this stop.

INDICATION DISPLAYED: **TRANSPORT, JAM**

RECOVERY PROCEDURE:

There is a jam or misfeed in the transport. Two cards must be placed back in the hopper.

- Machine without selective stacker:

  1. Examine the transport for a jam at the pre-read or read station, or for two cards at the pre-read station.
  2. If you only recovered one card from the transport, remove the last card that entered the active side of stacker 1.
  3. Place these cards in correct sequence under the cards in the hopper and close the hopper door.
  4. Press the start key.

- Machine with selective stacker:

  1. Examine the transport, from the start of the pre-read station to the end of the post-read station, for cards.
  2. Place the last 2 cards fed (that is, the two cards closest to the hopper) in correct sequence under the cards in the hopper and close the hopper door.
  3. Place any remaining cards in their appropriate stackers.
  4. Press the start key.

  NOTE: The permanent error key is operative during this stop.

INDICATION DISPLAYED: **STACKER, JAM**

RECOVERY PROCEDURE:

1. Remove card jam from the stacker area.
2. Place these cards in correct stacker or stackers, preserving card sequence.
3. Press the start key.

NOTE: Data integrity is preserved. The subsystem cannot ensure card sequence for cards in the jam. The permanent error key is operative during this stop.

INDICATION DISPLAYED: **JAM, CHECK CARD, TRANSPORT**

RECOVERY PROCEDURE:

1. Remove two cards from the transport. If you only recovered one card from the transport, remove the last card that entered the active side of stacker 1.
2. Check the cards; repair or reproduce any with damaged edges.
3. Place cards (or their replacements) in correct sequence under the cards in the hopper and close the hopper door.
4. If selective stacker, place the last two cards fed (that is, the two cards closest to the hopper) in correct sequence under the cards in the hopper and close the hopper door.
5. Press the start key.

NOTE: The permanent error key is active during this stop.

INDICATION DISPLAYED: **JAM, TRANSPORT, HOPPER, REPLACE 1**

RECOVERY PROCEDURE:

There is a jam or misfeed in the transport. One card must be placed back in the hopper.

- Machine without selective stacker:

  1. Examine the transport for a jam at the read station or for a card in the pre-read station.
  2. If none, remove the last card that entered the active side of stacker 1.
  3. Place the removed card in the hopper and close the hopper door.
  4. Press the start key and the end-of-file key.

- Machine with selective stacker:

  1. Examine the transport for a jam at the read station or for a card in the pre-read station.
  2. If you did not remove a card there, examine the post-read station. Remove the card, if any.
  3. Place the removed card in the hopper and close the hopper door.
  4. Press the start key and the end-of-file key.

INDICATION DISPLAYED: **JAM, TRANSPORT, CHECK CARD, HOPPER REPLACE 1**

RECOVERY PROCEDURE:

1. Locate and remove the card from the transport.
2. Check the card for damaged edges.
3. Repair or reproduce the card, if necessary.
4. Place the card in the hopper.
5. Press the start key and end-of-file key.

NOTE: The permanent error key is operative during this stop.

INDICATION DISPLAYED: **FORMAT RESET**

RECOVERY PROCEDURE:

Indicates that an optical mark read or read column eliminate format has been reset by an unformatted read only command or by an unformatted read, feed and select stacker command. If this error occurs within a job, and if the operator has no other information from the programmer, the operator should press the stop key, permanent error key, then the start key to make the device ready. If this error occurs within a job and the programmer has provided operator instructions, the operator should follow these instructions. If this error occurs at job initiation, the operator should NPRO, place the last two cards entering the active side of stacker 1 in correct sequence under the cards in the hopper, close the hopper door, and press the start key.

INDICATION DISPLAYED: **NPRO. PERMANENT ERROR**

RECOVERY PROCEDURE:

This is a device permanent error – command reject.

1. Perform the error recovery specified by the source program for this type of error.

INDICATION DISPLAYED: **JAM, TRANSPORT, PERMANENT ERROR**

RECOVERY PROCEDURE:

This is a device permanent error.

1. If the reader has a log-out key, press it and write down the digits from each row of the backlighted panel.
2. If the reader has no log-out key, record the error information from the reader log display at the system console.
3. When you report the problem to the CE, also report the error information you recorded.

INDICATION DISPLAYED: **JAM, MACHINE CHECK, PERMANENT ERROR**

RECOVERY PROCEDURE:

Consider this a permanent error condition and perform the procedure specified by the source program. During this procedure the NPRO key should be pressed with the hopper door open to run cards out of the unit.

3525 Stop Indications and Restart Procedures

Source: GA21-9124-3 3505 Card Reader 3525 Card Punch Subsystem Component Description

CHIP BOX	STACKER	COVER OPEN	FEED OPEN
CHECK CARD 8	PRESS START 4	FORMAT RESET 2	3 CARD RUN IN 1
NPRO 8	JAM 4	MACHINE CHECK 2	PERM ERROR 1
OFFLINE	MIS SELECT	STACKER 3	PRINT SKEW

If indicators are not in a combination shown on any error display, or if an operator recovery action is unsuccessful, treat the condition as a permanent error and perform the procedure specified by the source program.

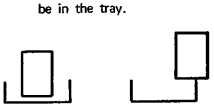
INDICATION DISPLAYED: **CHIP BOX**

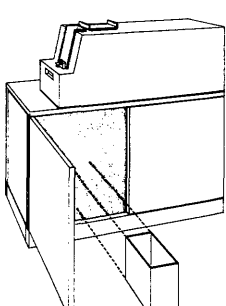
RECOVERY PROCEDURE:

1. Remove and empty the chip box.
2. Place the chip box back into the machine.

NOTE: After the chip box light comes on, the punch continues to operate for a reasonable period of time if the box is in the machine and properly positioned. However, when the chip box becomes too full to permit machine operation, the operator call light will come on and the punch will stop.

NOTE: Chip box must be in the tray.





NOTE: The permanent error key is operative during this stop.

INDICATION DISPLAYED: **STACKER**

RECOVERY PROCEDURE:

1. Empty the full stacker.
2. Press the start key.

NOTE: If the stacker light is on and neither stacker 1 nor stacker 2 is full, check for the reject stacker being full.

NOTE: The permanent error key is operative during this stop.

INDICATION DISPLAYED: **COVER OPEN**

RECOVERY PROCEDURE:

1. Close any cover that is open.
2. Press the start key.

NOTE: The permanent error key is operative during this stop.

INDICATION DISPLAYED: **FEED OPEN**

RECOVERY PROCEDURE:

1. Make sure upper read head is latched.
2. Close and latch the feed mechanism.
3. Press the start key.

NOTE: The permanent error key is operative during this stop.

INDICATION DISPLAYED: **JAM, 3 CARD RUN IN**

RECOVERY PROCEDURE:

1. Remove cards from the transport manually, keeping them in sequence.
2. Repair or reproduce any damaged cards offline; reassemble cards in correct sequence and place them with undamaged cards.
3. - If 3 CARD RUN IN is blinking, place the last two cards below the cards in the hopper and discard the preceding card.

   - If 3 CARD RUN IN is *not* blinking, place last three cards below cards in hopper.
4. Place remaining cards in correct stacker or stackers.
5. Press the start key.

NOTE: The permanent error key is operative during this stop.

INDICATION DISPLAYED: **JAM, MACHINE CHECK, 3 CARD RUN IN**

RECOVERY PROCEDURE:

1. Remove all cards from the transport manually, keeping them in sequence.
2. Repair or reproduce any damaged cards offline, then put them, in correct sequence, with the undamaged cards.
3. Place all cards removed at the bottom of the deck in the hopper.
4. Press the start key.

NOTE: The permanent error key is operative during this stop. This is the only time that more than three cards can be returned to the hopper.

INDICATION DISPLAYED: **NPRO, MACHINE CHECK**

RECOVERY PROCEDURE:

1. Empty stacker 1.
2. NPRO (While holding cards in hopper away from bottom of hopper, run cards out of transport by holding the NPRO key down.)
3. Remove all other cards from stacker 1 and place them in their correct stacker or stackers, if possible. If you cannot determine the correct stackers for these cards, put them aside for later manual distribution.
4. Press the start key.

NOTE: The permanent error key is operative during this stop.

INDICATION DISPLAYED: **JAM**

RECOVERY PROCEDURE:

1. Remove cards from the card transport area manually, keeping the cards in their correct sequence.
2. Repair or reproduce any damaged cards.
3. Place these cards in their correct place with those removed from the transport area.
4.
   - If the jam occurred during a run-in operation:
     a. Place the cards in the hopper.
     b. Press the start key.
   - If the jam occurred during an NPRO operation:
     a. Place the cards in their appropriate stackers.
     b. Continue performing the procedure under progress when the jam occurred.

NOTE: The permanent error key is operative during this step.

INDICATION DISPLAYED: **JAM, PRESS START**

RECOVERY PROCEDURE:

1. Remove cards from stacker manually, keeping cards in correct sequence.
2. Repair or reproduce any damaged cards offline, then reassemble them in correct sequence with the undamaged cards; place all these cards in the stacker(s).
3. Press the start key.

NOTE: The permanent error key is operative during this stop.

INDICATION DISPLAYED: **MACHINE CHECK, PRESS START**

RECOVERY PROCEDURE:

1. Press the start key.

NOTE: The permanent error key is operative during this stop.

INDICATION DISPLAYED: **NPRO, 3 CARD RUN IN**

RECOVERY PROCEDURE:

1. Remove cards from hopper and examine throat area.
   a. If partially-fed card is stuck in throat, remove it, repair or replace it, and put it on bottom of stack removed from hopper.
   b. Remove any dust or pieces of paper from throat area.
2. Empty stacker 1.
3. NPRO (press the NPRO key.)
4. • If 3 CARD RUN IN is blinking, discard first card that entered stacker 1; place any other stacker 1 cards in hopper.
   • If 3 CARD RUN IN is not blinking, place all cards that entered stacker 1 in hopper.
5. Place cards removed from hopper back into hopper.
6. Press the start key.

NOTE: The permanent error key is operative during this stop. During NPRO, three cards should enter stacker 1 unless one card was stuck in throat; if card was stuck in throat, two cards should enter stacker 1.

INDICATION DISPLAYED: **JAM, PERMANENT ERROR**

RECOVERY PROCEDURE:

1. Manually remove all cards from the card transport.
2. Perform the procedure specified by the source program

INDICATION DISPLAYED: **JAM, MACHINE CHECK, PERMANENT ERROR**

RECOVERY PROCEDURE:

1. Manually remove all cards from the card transport.
2. Perform the procedure specified by the source program.

INDICATION DISPLAYED: **JAM, PRESS START, MISSELECT**

RECOVERY PROCEDURE:

A punch error occurred and the error card failed to enter stacker 3.

1. Examine the last cards to enter stackers 1 and 2 for a card containing a punch error. Place this card in stacker 3.
2. Press the start key.

NOTE: The permanent error key is operative during this stop.

INDICATION DISPLAYED: **JAM, PRESS START, MISSELECT, STACKER 3**

RECOVERY PROCEDURE;

For a non-punch or read-punch job,

1. Examine stacker 3 for error-free data cards misselected into the stacker.
2. Place these cards in stacker 1 or stacker 2, as appropriate.
3. Press the start key.

For an unknown job,

1. Examine all stackers for misselected cards.
2. If correct stacker can be determined, place cards in correct stacker and press start key.
3. If correct stacker cannot be determined, post permanent error.

NOTE: The permanent error key is operative during this stop.

INDICATION DISPLAYED: **PRINT SKEW, PRESS START**

RECOVERY PROCEDURE:

1. Inspect the last 2 cards in each stacker for skewed printing. If necessary, manually reproduce and print the cards, or place them aside for later reproduction.
2. Replace these cards in their correct stackers.
3. Press the start key.

NOTE: The permanent error key is operative during this stop.

INDICATION DISPLAYED: **NPRO, PERM ERROR**

RECOVERY PROCEDURE:

1. Press stop key, then logout key. If logout number is 4 and 2 on upper line and the lower line is blank, go to step 4. Otherwise, go to step 2.
2. Check for card jam between punch and print stations. If there is a jam, remove cards from transport, then go to step 4. If no jam exists, go to step 3.
3. Did someone NPRO a job without NPRO or PERM ERROR lighted? If so, restart the job. If not, cancel the job and have the program corrected.
4. Perform the procedure specified by the source program. During this procedure, run cards out of the transport by pressing the NPRO key.

INDICATION DISPLAYED: NPRO, CHECK CARD

RECOVERY PROCEDURE:

1. Press the stop key: the 3-card run-in light will come on.
2. Empty stacker 1.
3. NPRO. (While holding cards in hopper away from bottom of hopper, run cards out of transport by holding the NPRO key down.)
4. If there are cards remaining in the hopper and only two cards NPRO to stacker 1, press permanent error key twice to cause two card run-in.
5. Remove and examine the cards that ran into stacker 1. Repair, or replace with a manually-reproduced card, any damaged cards.
6. Place all these run-out cards under the deck in the hopper, maintaining correct card sequence.
7. Press the start key.

NOTE: The permanent error key is operative during this stop. If indication is continuous, check to be sure that upper read head is latched.

INDICATION DISPLAYED: FORMAT RESET

RECOVERY PROCEDURE:

Indicates that a read column eliminate format has been reset by an unformatted read only command or by an unformatted read, feed, and select stacker command. If this error occurs within a job, and if the operator has no other information from the programmer, the operator should press the stop key, permanent error key, then the start key to make the device ready. If this error occurs within a job and the programmer has provided operator instructions, the operator should follow these instructions. If this error occurs at job initiation, the operator should NPRO (lift the cards off the bottom of the hopper and press the NPRO key), load the last two cards entering stacker 1 back under the cards in the hopper, and press the start key.

NOTE: The permanent error key is operative during this stop

INDICATION DISPLAYED: OFFLINE

RECOVERY PROCEDURE:

Indicates that the 3535 is disconnected from the system functionally.

To place the 3525 online:

1. Set the ONLINE/OFFLINE switch to its ONLINE setting.

NOTE: The ONLINE/OFFLINE switch is located at the attachment. If the 3525 is attached to the 3505, the switch is under the 3505 front cover.

INDICATION DISPLAYED: **3 CARD RUN IN**

RECOVERY PROCEDURE:

The recovery from the previous error has not been completed.

1. • If 3 CARD RUN IN is blinking, clear the transport and discard the card at the print station.
   • If 3 CARD RUN IN is *not* blinking, clear the transport, but do not discard the card.
2. Continue with the recovery procedure being performed when this display came on.

If you are starting a new job, press the permanent error key twice to cancel the recovery. *CAUTION:* Pressing the key cancels the recovery and recovery cannot be accomplished.

INDICATION DISPLAYED: **PERMANENT ERROR**

RECOVERY PROCEDURE:

If this indicator is lighted and you did not press the permanent error key deliberately, press the permanent error key to turn the light off. This will ensure that a permanent error indication posted for the last job, (or one resulting from an unintended depression of the permanent error key) will not be associated with the present job.

INDICATION DISPLAYED: **STACKER 3**

RECOVERY PROCEDURE:

The stacker 3 indicator can be on either alone or in combination with other indications. It comes on when a card enters the reject stacker and remains on until the start key is pressed.

If the job being processed is a data security job—that is, if it is important for the cards or the information they contain to be kept under security—the reject stacker (stacker 3) must be emptied, as part of the restart procedure before the start key is pressed, and at the end of the job. Nonsecurity error cards should be collected for the customer engineer's examination.

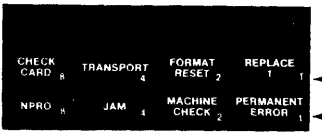
INDICATION DISPLAYED: **3 CARD RUN IN, PRESS START**

RECOVERY PROCEDURE:

1. Ensure that the last card stacked entered the correct stacker.
2. Remove cards from the transport manually, keeping them in sequence.
3. Repair or reproduce any damaged cards offline; reassemble cards in correct sequence and place them with undamaged cards.
4. Place last three cards below the cards in the hopper.
5. Place remaining cards in correct stacker or stackers.
6. Press the start key.

NOTE: The permanent error key is operative during this stop.

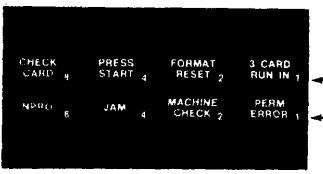
LOG-OUT INDICATIONS (NUMBERS)



READER

Upper row of digits* } Log-Out Numbers

Lower row of digits* }



PUNCH

Upper row of digits* } Log-Out Numbers

Lower row of digits* }

*Ignore the words.

The back lighted panel serves two functions. Normally, the panel displays indications that show the operator what procedure to follow to recover from an error. (These indications have been discussed earlier in this manual.) When a permanent error occurs that requires machine repair, the recovery procedure directs the operator to press the log-out key. When a permanent error occurs that requires machine repair, the recovery procedure directs the operator to press the log-out key. This causes the panel to display a different set of indications, which are called log-out numbers. (The words displayed on a log-out indication are meaningless and should be ignored.) When the operator calls to report the problem, he should tell the customer engineer what digits are displayed in the upper row, then what digits are displayed in the lower row. If no digits are shown in a row, the operator should report that the row is blank.

EXAMPLE:

Indication			Possible Report to CE
CHECK CARD 8	PRESS START 4	3 CARD RUN IN 1	
		← Upper Row	"The 3525 is not working. The upper row of log-out digits displays 8, 4, 1. The lower row is blank."
		← Lower Row	

3525 Error Recovery Routine

Source: GA21-9124-3 3505 Card Reader 3525 Card Punch Subsystem Component Description

Before any programmed punch and/or print retries are performed, the operator must remove all cards that must be completely or partially reprocessed. Your source program error recovery routine can help the operator to decide which cards need to be removed. Some of the information your routine could provide is:

1. The number of cards to be removed.
2. The location of the cards to be removed.
3. Identification by data content of the cards to be removed.
4. The number of blank cards to be put in the 3525 for the recovery procedure.

The error recovery routine should then punch and/or print the data for the card that must be completely reprocessed. Then punch and/or print the data for the next card that must be partially reprocessed. The error recovery routine can then return to the normal source program to finish processing that next card.

For specific recovery techniques, be guided by the error message you receive from the System Control Program in use.

HOW TO RESTART A JOB

Automatic Restart

When you receive the message requesting your authorization for a restart:

xxIEF225D SHOULD jobname.stepname.procstepname [checkid] RESTART

you must reply to the request as follows:

r id,{'YES' / 'HOLD' / 'NO'}

YES authorizes the restart, HOLD postpones it, and NO prohibits it. After a YES reply the job is reinterpreted by a restart reader named IEFREINT that is started automatically by the system, and if a MONITOR JOBNAMES is in effect, IEFREINT STARTED and IEFREINT ENDED messages are displayed. These are followed by normal mount messages and a successful restart message.

Deferred Restart

To perform a deferred step restart in VS1, the job to be restarted must be resubmitted. Normal mount messages are displayed.

HOW TO RESTART A JOB

Automatic Restart

During processing related to automatic checkpoint/restart in VS2, the system issues the following sequence of messages to the operator:

1. A message each time a checkpoint entry is written. Each message contains the checkpoint id.
2. An ABEND message for the job step if it terminates abnormally:

   IEF450I jobname,stepname,procstepname ABEND code

3. If the ABEND code makes the job step eligible for restart, the system issues this message:

   xxIEF225D SHOULD jobname.stepname.procstepname [checkid] RESTART

   to which the operator must reply:

r id,{'YES' / 'HOLD' / 'NO'}

   YES authorizes the restart, HOLD postpones it, and NO prohibits it. If restart is authorized and MONITOR JOBNAMES is in effect, messages IEFREINT STARTED and IEFREINT ENDED will appear. IEFREINT is the name of the 'restart reader.'

4. Message indicating the virtual storage requirements (beginning address and ending address) of the job step to be restarted.
5. Normal mount messages.
6. A successful restart message.

Deferred Restart

To perform a deferred step restart in VS2, the job to be restarted must be resubmitted. Messages containing checkpoint entry ids displayed previously on the console during original execution of the job may be used by the programmer preparing the job for resubmission. When the resubmitted job is restarted, the operator will receive these messages on the console:

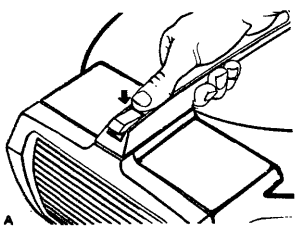
1. A message indicating virtual storage requirements of the job.
2. Normal mount messages.
3. A successful restart message.

READ ONLY FUNCTION

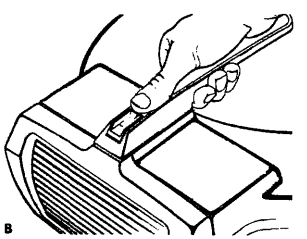
The means to protect previously written data modules is provided by the Read Only function. The following procedures show how to enable or disable the Read Only function for either 3348 model.

Enable Read Only Function

1. With data module removed from the drive, press down on IBM logo inset of the handle (A).



2. Turn inset 180° and snap into place (B).
3. The data module may now be loaded in the desired drive.

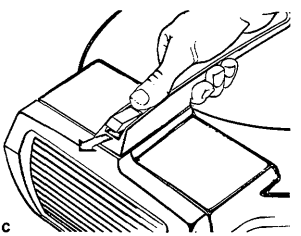


IBM 3340 Disk Drive (cont'd)

Disable Read Only Function

1. With the data module removed from the drive, return the IBM logo inset to its original position (reverse 180°) (C).
2. The data module may now be loaded into the desired drive.

Note: Do not attempt to enable or disable the Read Only function while the data module rests in the drive shroud recess.



C

Operating Hints

When you take a 3340 drive offline and want to start it up again, press START STOP. The drive cycles up. Then press the ATTENTION button. ATTENTION must be used to signal the system that the drive is ready.

Do not use Power-On or Power-Off switches to load or unload the data module, because these switches are bypassed by the subsystem sequencing controls during a subsystem power-up or power-down operation. Power is turned on or removed by the subsystem sequencing controls.

Console File

Source: GA33-1509-0 System/370 Mod 125 Procedures

The console loads microprogram on diagnostic programs into the system. It is also used by the system to store logs. The microprogram diagnostic programs and logs are stored on lightweight magnetic disk cartridges (diskettes).

IBM Diskette

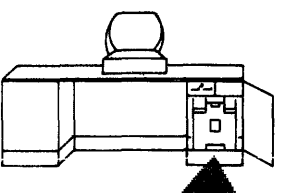
Source: GA33-1509 System/370 Mod 125 Procedures

There are two types of diskettes:

- The system diskette
- The service diskette

The System Diskette is used for normal operation.

The Service Diskette is used for loading ASCP.

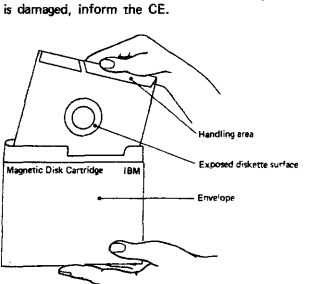


CONSOLE FILE

Because the magnetic disk cartridge (diskette) contains information that is vital to system operation, it must be properly safeguarded.

Avoid:

- Rough handling of the diskette. Never write on or mark the diskette.
- Localized pressure on any part of the diskette.
- Strong, direct sunlight on the diskette.
- Attempts to clean the diskette in any way.
- Exposure of the diskette to magnetic fields. Keep away from all metal objects.
- Touching of exposed diskette surfaces. Use the handling area. If a magnetic disk cartridge is damaged, inform the CE.

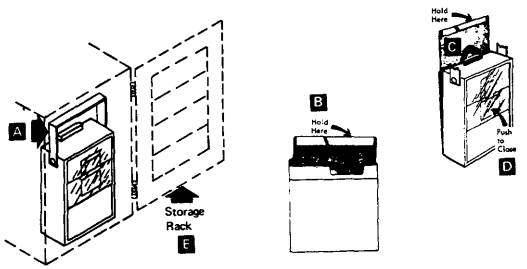


IBM Diskette (cont'd)
Operating Procedures
Source: GC38-0015-3 IBM System/370 Mod 145 Operating Procedures

CONSOLE FILE CARTRIDGE INSERTION and REMOVAL

Insertion

1. Pull handle [A] to open console-file cover.
2. Grasp the cartridge [B] by its white handling area and remove it from its envelope.
3. Lower the cartridge [C] until it is stopped by the locating surfaces.
4. Close cover carefully [D]. The centering cone must slide freely into the center of the disk. If not, check that the cartridge is seated against the locating surfaces and that the cartridge is not damaged.
5. Return the empty carriage envelope to the disk storage rack. [E]



Removal

1. Pull handle [A] to open console-file cover.
2. Grasp the cartridge [B] by its white handling area and lift it straight up.
3. Slide the cartridge into its envelope and return it to the disk storage rack [E] or to the storage area.

Storing Cartridges

Before using, acclimate cartridges to the computer room:

If in mailing carton, wait 24 hours.
If not in mailing carton, wait 1 hour.
If mounted on a nonpowered file, wait ½ hour.

Place cartridges in their envelopes and store them either in the storage rack or in their original mailing cartons. A storage environment should meet the following criteria:

Temperature	40°–100°F (4.4°–37.8°C)
Relative Humidity	8%–80%
Maximum Wet Bulb Temperature	80°F (26.7°C)

Shipping and Receiving

Ship cartridges inside the original shipping carton. Additional shipping cartons are available at IBM Branch Offices. With the cartridge in place, the package weighs 10 ounces. Be sure to label the package, "DO NOT EXPOSE TO HEAT OR SUNLIGHT."

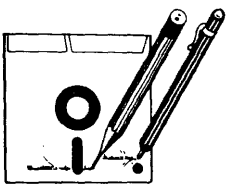
When receiving cartridges, check for carton and cartridge damage. Save the carton for storing a cartridge and for possible future cartridge shipment.

IBM Diskette (cont'd)
Cartridge Handling

Source: GC38-0015-3 IBM System/370 Mod 145 Operating Procedures

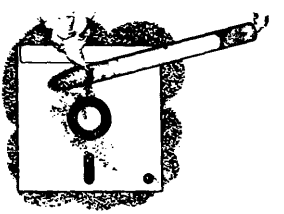
- The disk cartridge contains information vital to system operation which may not be easily duplicated. HANDLE THE CARTRIDGE WITH CARE!

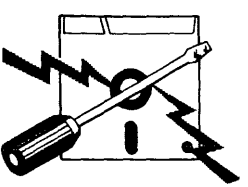
CAUTIONS



- No pens or pencils. Never write on disk cartridge. Writing pressure damages disk.

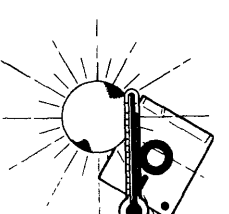
- No smoking while handling cartridges.





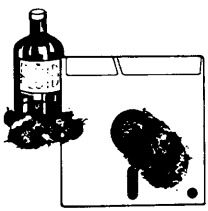
- Keep cartridge away from magnetic fields or from ferromagnetic materials which might be magnetized.

- Do not expose cartridges to heat or sunlight.



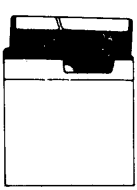
IBM Diskette (cont'd)
Cartridge Handling (cont'd)

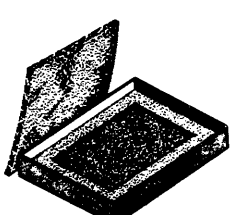
- Replace cartridge envelopes when they become worn, cracked, or distorted.



- Do not touch or clean the disk surface.

- Return cartridge to envelope whenever it is removed from the console file.





- Store cartridges in their original shipping cartons, or in the storage rack on the access door.

Operating Procedure after Failures*

1. The tape unit fails to sense the BOT marker and continues to search forward for it.

   a. Ensure that the BOT marker is properly positioned 14 to 18 feet from the physical beginning of tape. (If not, replace the marker.)
   b. Re-try load procedure, ensuring that the BOT marker is to the left of the left-hand idler before pressing the LOAD REWIND button.

2. Tape fails to load properly in either column or both columns, or it dumps in either column.

   Open vacuum column door and check the door and column edges for contaminants that may have prevented proper sealing. Re-try load procedure.

3. Tape unit fails to sense the end-of-tape (EOT) marker and tape unwinds completely off file reel.

   a. Ensure that the EOT marker is properly positioned approximately 25 feet from the physical end of tape. (If not, replace the marker.) If the marker is properly positioned, the failure could be a programming error or a machine malfunction.
   b. Thread tape back across idlers and onto the file reel. Manually wind 10 to 15 turns counterclockwise on file reel and remove all slack. Press the LOAD REWIND button. As soon as the tape is loaded and starts to move, press the RESET button. Then press either the LOAD REWIND or the UNLOAD REWIND button, depending on the action desired.

4. Permanent write failures occur immediately beyond BOT.

   a. Check the read/write head for contamination. If any doubt exists, clean the head (see "Cleaning Procedures"). Re-try job.
   b. If problem recurs, mount a different reel of tape and re-try job.

5. Power is dropped while tape is loaded and not at BOT.

   Manually rewind all slack between reels. Restore power and press the RESET and LOAD REWIND buttons. Tape loads into columns and starts moving forward. Again press the RESET button and then press either the LOAD REWIND or the UNLOAD REWIND button, depending on what action is desired.

Cleaning Procedures

Clean tape transport and capstan every eight hours. Use cleaning kit, part 352465, and tape transport cleaner.

Note: Use IBM tape transport cleaner, part 453511, or competitive formulations of the same chemical composition. Performance results cannot be guaranteed when other chemical formulations are used, because they have not been tested by IBM, and their use may impair performance or cause damage to the tape unit or tape.

CAUTION

1. Avoid prolonged skin contact with tape cleaner.
2. Never clean a tape unit with a metal object. Use only materials specified for each operation.
3. Never touch rubber capstan surface with bare fingers; moisture or oil impairs tape-to-capstan friction.
4. Remove any tape cleaner dropped in the tape path, on the tape guides, or on the idlers during cleaning.
5. *Don't use water in the capstan area or the read/write head area.*
6. Never get fluids of any kind in or near the column sensors.
7. Do not use the flat area of top cover or the sliding door surface as a work area.

* If failures continue after recommended action has been taken, notify the CE.

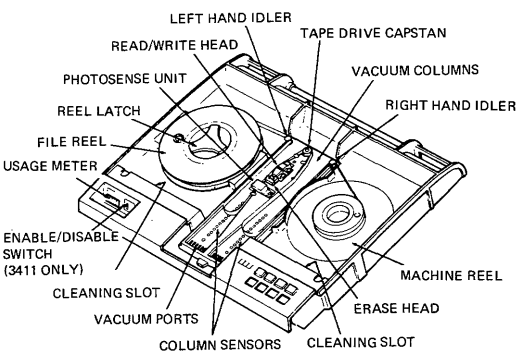
IBM 3410/3411 Tape Drive
Tape Transport Cleaning
Source: G232-0004 3410/3411 Operator's Guide

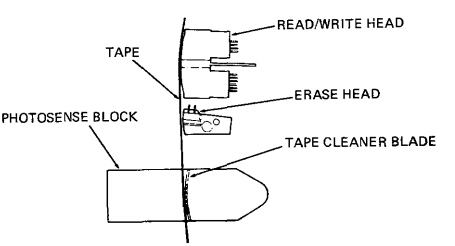
Tape Transport Cleaning

1. Unload tape and remove from tape unit.
2. Clean tape guides, tape path, idlers, vacuum columns, and vacuum column door with a lint-free cloth moistened with tape cleaner. Use the small brush moistened with tape cleaner to clean the cleaner blade and corners of tape guides. Water may be used to remove oxide residues only in the vacuum columns. Do not use water on or near the capstan, column sensors, or the read/write head.
3. Clean the read/write head surface with the small brush.
4. Wipe the read/write head and the erase head with a lint-free cloth moistened with tape cleaner.
5. The cleaning slots are used for brushing residue out of the recessed areas in the deck.

Capstan Cleaning

1. Rotate the capstan with a finger covered with a lint-free cloth. With the other hand, wipe the capstan surface with a lint-free cloth moistened with tape cleaner. Use no water in this area, and AVOID EXCESSIVE cleaning pressure.
2. Dry the capstan surface with a lint-free cloth before loading tape. AVOID EXCESSIVE PRESSURE.





IBM 3410/3411 Tape Drive
Tape Handling and Storage
Source: GA32-0022 IBM 3410/3411 Magnetic Tape Subsystem Component Description

Tape Handling

A tape reel that is not in use on a tape unit should always be stored in its container. Establish procedures to protect magnetic tape from contamination which causes degraded tape unit performance. Some common rules are:

1. Never leave tape reels or containers exposed. Tape may be damaged, or dust accumulating on the tape or in the container can contaminate the tape.
2. Erasing a tape reel identification label is a cause of contamination. Use new labels when changing reel identification. Select a label with an adhesive backing that does not leave a residue and that can be applied and removed easily.
3. Never allow a loose end of tape to trail on the floor; dirt picked up in this manner can reach the tape transport and be passed on to other sections of the tape.
4. Do not allow smoking in areas where tape is in use. Ashes contaminate tape. Live ashes can permanently damage the tape surface.
5. Don't touch the tape edges through the reel openings or press on the reel flanges. Such pressure will compress the tape and damage its edges.
6. Be very careful when removing the write-enable ring. Always unload tape before removing the write-enable ring; never remove the ring while tape is loaded on the tape unit.

Tape Storage

To prevent tape contamination and damage during storage, follow these procedures:

1. Before a tape is stored, secure the loose end of tape with a tape end retainer to prevent the tape from unwinding in the container.
2. Use gum-free type labels only.
3. Always store tape in an upright position. Never store tapes flat or in stacks; accidental damage or reel warpage may result.
4. Store tapes in a cabinet or shelf elevated from the floor and away from sources of paper and dust. Dust can be transferred from the outside of the container to the reel during load and unload operations.
5. To increase life of tapes and system performance, maintain library room temperature at 70° to 75°F and humidity at 30%. Humidity level is important.

IBM 3420 Tape Drive

Source: 8232-0003-2 IBM 3420 Operator's Guide
6A32-0020 IBM 3803 3420 Magnetic Tape Subsystem Component Description

CLEANING PROCEDURE

Refer to Tape Unit Cleaning Procedure, order number GY32-5034-0.

OPERATING PROCEDURES AFTER FAILURE

Tape Fails to Thread (With Cartridge)

1. Remove reel and cartridge.
2. Ensure tape end is undamaged and hangs free in cartridge (if necessary, trim end with cutter, part 2512063).
3. Check that unlatching cartridge toggle opens tape port.
4. Remount reel and cartridge and retry load procedure.
5. If failure recurs, remove reel from cartridge and try load procedure without cartridge.

Tape Fails to Thread (Without Cartridge)

1. Ensure tape end is undamaged and positioned in threading chute (if necessary, trim end with cutter, part 2512063).
2. Open doors and clear any obstructions from tape path.
3. Close doors and retry load procedure. If unit still fails, notify CE.

End of Tape Comes Off Machine Reel Hub as Tape Loads in Columns

Check leader length (distance from tape end to BOT marker). Tapes with less than 10-foot (3m) leaders may not load reliably. To recover information from tape with **short** leader, attach additional **temporary** leader with clear cellophane tape.

NOTE: After information is recovered (reproduced on another tape reel), recondition source reel by cutting off old leader and BOT marker. Trim end with cutter, and apply new BOT marker about 15 feet (4,6m) from leading end. Have marker parallel to and about 1/32 inch (0,8 mm) from front edge of tape. Marker must not be wrinkled nor extended beyond tape edge.

Tape Unit Fails to Sense EOT Marker (Tape End Comes Off File Reel)

Verify presence of EOT marker approximately 25 feet (7,6m) from end of tape. If marker is present, malfunction could be program error or machine failure—notify CE.

1. **Rewind Procedure—With Cartridge:**
   a. Open front door and manually wind remaining tape on machine reel. Close front door and press RESET and UNLOAD. When cartridge closes, remove cartridge and reel and mount an empty reel on machine.
   b. Open doors, manually thread tape from machine reel through tape path, and wind approximately ten turns of tape on file reel. Close doors and press LOAD/REWIND.
   c. Unload tape unit and return reel to cartridge when rewinding is complete.
2. **Rewind Procedure—Without Cartridge:**
   Do (b) above. Unload tape unit when rewinding is complete.

Tape Threads Successfully But Fails to Load in Columns

Check for missing BOT marker, or incorrect leader length (distance from tape end to BOT marker). Tapes with more than 30-foot (9m) leaders may not load reliably. If neither condition is present, notify CE.

Window Fails to Open After Unload Operation

1. Open access door and manually wind remaining tape onto file reel.
2. Close front door and press RESET and UNLOAD.
3. Notify CE.

Channel Fails to Select Tape Unit (Device Switching or Two-Channel Switch Feature Installed)

Check that toggle switches on the appropriate 3803 operator's panel are set to enable selection of the desired tape control and tape unit. (Refer to *Subsystem Description—IBM 3803/3420 Magnetic Tape Subsystems,* order number GA32-0021, for a description of switch functions.)

1403

Suggested Restart Procedures for 1403

An I/O error causes an interruption condition. When unit check is detected by the program, sense information sent from the device control unit provides more detailed information concerning the cause of the unit check. As a result of program analysis of the sense information, an error message should be made available to the operator to indicate the condition.

The following information describes the minimum actions that should be performed when the program detects unit check.

The actions are related to particular sense indications that can occur. These bits are analyzed by the program. The choice of action(s) to be taken by the operator must be established at the installation.

Intervention Required (Sense Bit 1)

The printer enters a not-ready condition (Ready light off) because one of the following has occurred:

1. **The 1403 Stop key is pressed.** (Possible operator error).

2. **A mechanical interlock,** such as the print unit, is open. (Possible operator error).

3. A forms check. When the Forms-Check light is on, paper feed trouble has occurred or the Carriage Stop Key has been pressed. (Also, the Ready light is off). Any jam condition must be corrected and the Check-Reset key must be pressed before the Start Key is effective. The program should provide an operator message and exit from this error recovery procedure. The operator should then perform one of the following:

   a. Correct the not-ready condition, accept the record, and allow the application program to proceed without further retries of the command, or

   b. Correct the not-ready condition and restart the program from a logical restart point. The logical restart point should be determined at the installation and specified to the operator.

4. **End of forms.** If an end-of-forms has occurred, the End-of-Forms light is on and the Ready light is off. To reset the printer, press the printer Start Key. The remaining lines of the form are then printed under program control. (Note that the Start Key is pressed only once.)

When a hole is then sensed in channel 1 of the carriage tape (either space to or skip to or by channel–1), the operation is terminated with both the End-of-Forms and Forms-Check lights on and the Ready light off. Printing does not occur for the line at which the channel-1 hole is sensed. Therefore, a carriage tape with a hole punched in channel 1 should be on the carriage. If there is no hole in channel 1, printing continues even if no forms are in the printer (except for Selective Tape Listing operations).

If no skip-to-channel-1 command is issued, lines are printed (after the last form) until the channel-1 punch is sensed. (For Selective Tape Listing operation, new tapes should be mounted when the end-of-forms indication occurs.)

The program should provide an operator message and exit from this error recovery procedure when the end-of-forms indication is detected. The operator should then perform a forms runout (as just described) and satisfy the requirements of the application program.

5. **Sync check.** This condition can occur whenever the print chain (or train) is out of synchronism with the print circuitry in the 2821. Depending upon when the sync check occurs, one of the following conditions exists:

   a. The sync check occurred when no printing was in progress (no line was printed).

   b. The sync check occurred during a print operation and one line was printed.

   c. The sync check occurred during printing and two lines were printed.

   The program should provide an operator message and exit from this error recovery procedure. The operator should then:

   a. Correct the not-ready condition (press the Check-Reset key and then the Start key) and allow the application program to proceed without further retries of the command, or

   b. Correct the not-ready condition (press the Check Reset key and then the Start key) and restart the program from a logical point.

   If the error persists, a call should be made to the Customer Engineer.

Data Check

Data check indicates that a code in a data record sent to the printer does not match a code in the UCS (Universal Character Set) feature storage. Printing does not occur in the print position to which the unmatching code applies. The entire line (except for the data check position) or only a portion of the line may be printed. Therefore, the last printed line may contain erroneous data and/or an incomplete record. Data check generally indicates that the UCS storage was improperly loaded or that a data record code (other than blank or null) does not compare to any code in the UCS storage.

The program should provide an operator message and exit from this error recovery procedure. The operator should then:

1. Accept the record and indicate that the application program is to proceed without further retry of the command, or

2. Cause the application program to restart from a logical point.

If the error persists, a call should be made to the Customer Engineer.

Parity Check

This bit indicates that a parity error has been detected in the UCS feature storage. The parity check can be reset only if the UCS storage is reloaded.

If the parity check occurs while the UCS storage is being loaded, retry the operation once. If the error persists, a call should be made to the Customer Engineer.

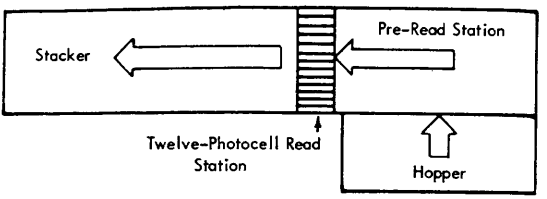
If the parity check occurs during printing, the last print line may contain erroneous data. Provide an operator message and exit from this error recovery procedure. At this time, the operator should:

1. Accept the record, cause the program to reload the UCS storage and proceed without further retry of the command, or

2. Cause the program to reload the UCS storage and restart the program at a logical point.

If the error persists, a call should be made to the Customer Engineer.

2501 CARD READER



Ready indicates that the 2501 can accept a command from the program. The ready light comes on when the following conditions exist:

1. Power is on.
2. A card is registered at the pre-read station.
3. Cards are in the hopper, or the end-of-file key has been pressed.
4. The stacker is not full.
5. No feed check condition exists.
6. No cover interlocks are opened.
7. The stop key has not been pressed since the last depression of the start key. NOTE: Device end status is generated when the 2501 is made Ready. If the 2501 is made Not Ready, and then made Ready again before the channel accepts the first Device End, the ready light does not come on until this status is accepted.

Read Check (Equipment Check sense indicator) comes on when a card is not being read properly. This condition can result from off-punched cards or incorrect registration of cards in the transport. The Read Check is reset by the next read command from the program when the 2501 is not busy.

Validity Check (Data Check sense indicator) informs the operator that the card just read in data mode 1 contains more than one punch in rows 1-7 of a column. The validity check is reset by the next read command from the program when the 2501 is not busy.

Feed Check (Intervention-Required sense indicator) indicates a card jam or improperly positioned card in the hopper, transport, or stacker; or a failure of one of the read-station photocells or lamps. Usually, a feed check can be reset by an NPRO operation; otherwise, the operator must manually remove jammed cards from the transport or stacker area.

Error-Recovery Summary				
Sense Byte 0		Sense Byte 1		
Bit Pos	Name	Bit Pos	Name	Probable Cause
0	Command Reject			Invalid command
1	Intervention Required	2	Print Quality	Platen failed to advance Ribbon motion & ribbon skew
		4	Forms Check	Jam or torn forms Channel 1 & end of forms Channel 1 & stacker full
	(Not Ready)	No Bits	Interlock Condition	Swing gate not latched Carriage stop/release off Train not positioned Stop key activated Vacuum check End of forms Stacker full Write after single cycle Train overload
2	Bus-out	Not CE & DE		Invalid parity on command
		CE & DE		Invalid parity on data xfer
3	Equipment Check	0	Command Retry	PLB parity check
		1	Print Check	Hammer fire check Sync check Coil protect
		2	Print Quality	Platen failed to advance Platen failed to retract Ribbon motion/skew
		3	Line Position	Carriage failed to move Carriage sequence Carriage stop
		6	Mechanical motion	Time-out Cancel
		No Bits		Transparent sync checks Train overload
4	Data Check	1 3	Print Check Line Position	Non compare UCSB Non compare FCB
5	Buffer Parity Check	0	Command Retry	Parity check UCSB
		3	Line Position	Parity check FCB
		No Bits	Write Command Complete	Parity check UCSB
		No Bits	UCSB Read Command	Parity check UCSB
			FCB Read Command	Parity check FCB
			PLB Read Command	Parity check PLB
6	Load Check			UCSB FCB
7	Channel 9			Normal occurrence
		5	CMD Suppressed	Interface disconnect

Train Overload

1. Press COVER RAISE.
2. Open the swing gate by pulling out on the swing-gate release lever.
3. Pull the separator-frame release lever and open the separator frame.
4. Push the train-incrementor button to reset the overload check and to move the train. If the train turns freely (judged by the force required to push the train-incrementor button), the cause of the overload condition may also have been cleared. Attempt to return the printer to normal operation.
5. If the train continues to turn with difficulty or does not move at all, remove the cartridge (see "3216 Cartridge Removal") and push the train-incrementor button. If the train drive turns freely, install another cartridge if available, return the printer to operation, and call for service on the faulty cartridge. If the train drive binds or does not turn at all, call your service representative.

Forms Jam

When forms are feeding improperly due to forms separation or disengagement from the feed pins, the printer stops, FORM CHECK turns on, and the printer cover opens.

1. Open the swing gate by pulling out on the swing-gate release lever.
2. Inspect the forms in the area of the print line. If forms are not separated or damaged and appear to be feeding properly, check for a paper chad or other debris covering the forms-sensing device in the lower tractor. This can cause a false indication. Also check the black strip on the separator frame opposite the forms-sensing device. A buildup of paper dust on the strip can cause a false check.
3. Remove separated or damaged forms and use steps 4 through 17 of the forms loading procedure to reload forms.
4. Press CHECK RESET and PRINTER READY, and restart your program.
5. Use steps 19 through 29 of the forms loading procedure (see source publication) to return the printer to operation. Stacker rate, adjustable shelf, and stacker roll adjustments may not be necessary.

Carriage Check

If carriage motion is incorrect, the printer stops with CARRIAGE CHECK on.

1. Press COVER RAISE.
2. Open the swing gate by pulling out on the swing-gate release lever.
3. Determine if the forms are in proper position for the next print line.
4. Reposition forms if necessary, and set up to restart the program from an appropriate point.
5. Close and latch the swing gate.
6. Press CHECK RESET and PRINTER READY.
7. If carriage checks continue, call your service representative.

Print Check

A print check is indicated by the printer stopping with PRINT CHECK on.

1. Press COVER RAISE.
2. Open the swing gate by pulling out on the swing-gate release lever.
3. Inspect the last two printed lines.
4. If the printing is incorrect, set up to restart your program from a point ahead of the incorrect lines.
5. When set up, or if the printing appears correct, close and latch the swing gate and press CHECK RESET.
6. Press PRINTER READY and restart your program.
7. If print checks continue, call your service representative.

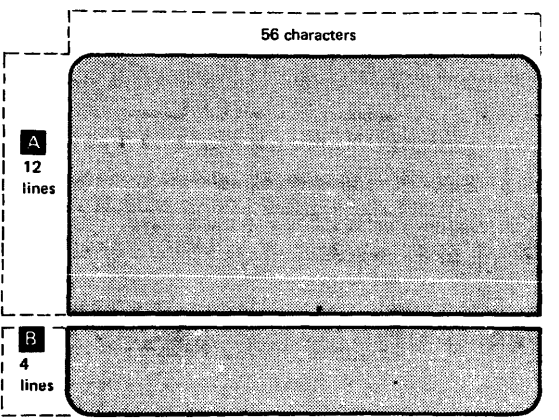
Model 125 Operator Console Video Screen

Source: GA33-1509-0 System/370 Mod 125 Procedures

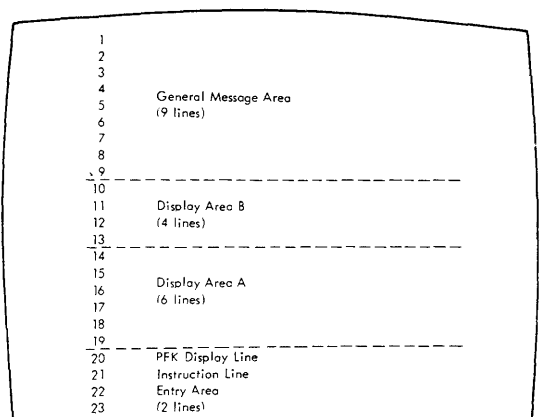
The Video Screen:

- Is a 15 in. video monitor.
- Is mounted on a separate table and can be rotated through 180°.
- Displays numeric characters, upper case alphabetic characters, and special symbols.
- Can be manually adjusted for intensity.
- Is equipped with a program-controlled audible alarm, which alerts the operator to messages requiring attention.

Display Format

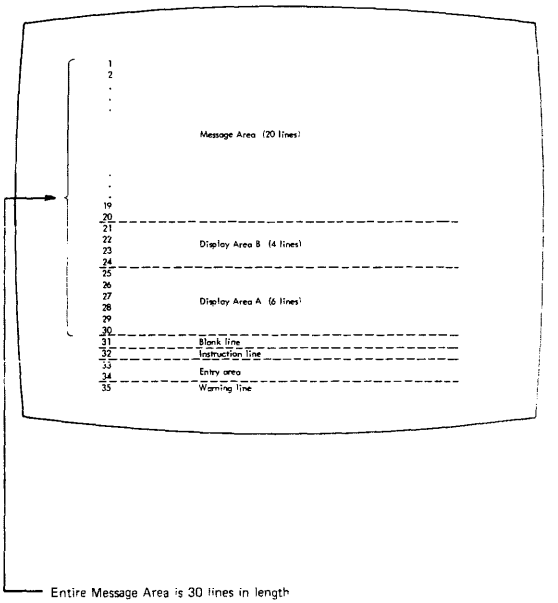


OS/VS Display Consoles
3277 and Model 158 Display Areas
Source: GC38-0260 OS/VS2 Display Consoles



Model 168 Display Console Display Areas

Source: GC38-0260 OS/VS2 Display Consoles



How to Start the System Using the 3277

To start the system using the 3277 display console, follow the same procedure that you follow for a printer-keyboard console:

- Set the LOAD UNIT dials to the unit address of the SYSRES volume, and press the LOAD key on the control panel.
- Respond to the system parameter messages that appear on the screen.
- Set the time and date.
- Start the system input readers and output writers.
- Vary devices offline as appropriate.

The Model 158 display console does not have LOAD UNIT dials or a LOAD key. After typing in the load unit address or pointing to it with the light pen, the operator points the light pen to the LOAD and EXECUTE functions in that order, which accomplishes the load.

Error Conditions

Several types of errors may occur that directly affect the operation of display consoles--errors caused either by a programming problem (system error) or a console malfunction (hardware error).

System Errors

When certain types of system errors occur, the screen is blanked, and an error message appears in the center of the screen.

Blank Screen and Error Message

If the error message indicates that a recoverable system error has occurred, perform the action specified by the error message, and then press the CANCEL key. This should restore the screen.

If the error message indicates that an unrecoverable system error has occurred, the system must be loaded again. Follow normal procedures for initial program load (IPL), and notify the programmer responsible for the system.

Console Inactivity

Console inactivity is characterized by a lack of messages or system response to commands.

If your console seems to be abnormally inactive, check the system response by requesting a display of the time:

```
D T
```

If it does not respond, cancel any status displays being presented on the inactive console using the procedure for erasing a status display.

If neither of these procedures returns the console to normal activity, check for a console hardware error.

Error Message Response

If a console hardware error occurs, the following message may appear on the screen:

```
IEE170E RETRYABLE ERROR. RECENT ACTION MAY NEED TO BE
    REPEATED. IEE170E PRESS THE CANCEL KEY TO RESTORE THE
SCREEN.
```

Perform the indicated action (press the CANCEL key). This should restore the screen, including messages displayed in the message area, the PFK display line, the instruction line, and the warning line.

Note: If you do not press the CANCEL key, the system will automatically rewrite the screen (same effect as CANCEL) after about 30 seconds have elapsed. If a console hardware error results from keyboard input, the system will always regard it as a temporary error. If it becomes apparent to you that the error is permanent, switch control to an alternate console (procedures for console switch are described in the Operator's Library *Reference* publication for the system you are using.)

Blank Screen Response

If the console screen goes blank, a console switch is probably taking place. The following message should appear on the new console:

```
IEE143I OLD=xxx, NEW=xxx, VALDCMD=xx
IEE143I ROUTCDE=xx[,xx] T=x H=x
```

In the actual message, the appropriate values will appear in place of the x's. Use the alternate console to continue operating the system, and have the old console checked for the source of the error.

NOTE: It is normal for the screen to go blank for a few seconds if the back-tab key is pressed when the cursor is not in the entry area.

Locked Keyboard Response

Sometimes the system is unable to blank the screen. If you find that you cannot enter commands through a console that appears normal, try to restore the screen by performing a CANCEL action.

If a console switch has taken place, operate the system from the alternate console, and have the old console examined for the source of the error.

NOTE: Inhibited input, with or without keyboard locking, may also occur when the system goes into an ABEND wait state or when a problem occurs in the message handling portion of the control program. Check the procedures described for console inactivity under "System Errors."

Operating Procedure

General Instructions

1. Compose the test message. Write it on a slip of paper if helpful.

2. If necessary, apply power to the display station. Press the CLEAR key and then the RESET key. This will result in an unformatted screen with the cursor in the upper left screen position.

3. Enter the test message from the keyboard.

4. If the Dial feature is installed, call the computer operator and establish a phone connection as explained in the section "Dial Procedure".

5. Press the TEST REQ key and note that the INPUT INHIBITED indicator comes on.

6. Check that the test pattern you requested is received at the selected display station or printer. This completes the entry and replay for the frist RFT message.

   Note: To check the Basic Test Pattern, you must enter data from the keyboard. Also, if the display station is equipped with a selector pen, check selector pen operation at this time. A step-by-step explanation of how to check the Basic Test Pattern follows these general instructions.

7. Repeat steps 1 through 6 for each succeeding RFT message until you have completed the RFT series for your display or printer. As you enter a new RFT message, the only change in the message format from the preceding message is the test pattern identification number.

8. Compare the test pattern received with the correct pattern as you finish each test. If you do not receive a test pattern correctly, report it to your supervisor and, if consistent with organizational policy, fill out an OPERATOR TROUBLE REPORT.

Operator Trouble Report

POWER FAILURE

UNIT IDENTIFICATION _____

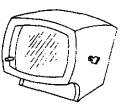
- ☐ Display station won't turn on.
- ☐ Display station was operating; went dead.
- ☐ Noticed smoke or unusual odor at the time.

FAILURE OF

☐ Printer

☐ Selector Pen

☐ Operator Identification Card Reader



☐ Display Station
☐ DISCONNECT switch (Dial Feature only)

☐ Keyboard
☐ Keyboard and DISCONNECT switch both inoperative. (Dial Feature only)

INDICATORS

Mark the indicators on when failure occurred.

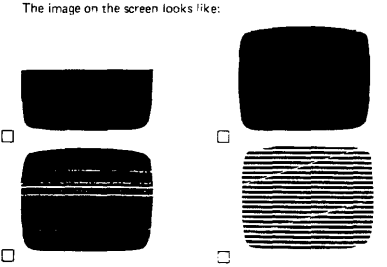
- ☐ SYSTEM READY
- ☐ SYNC SEARCH
- ☐ SELECTED
- ☐ TRANSMIT
- ☐ STATUS
- ☐ OFF HOOK/AUTO ANSWER (Dial Feature only)
- ☐ SYSTEM AVAILABLE
- ☐ INSERT MODE
- ☐ INPUT INHIBITED

One or more indicators:

- ☐ Light when they should not.
- ☐ Don't light when they should.

DISPLAY FAILURE

The image on the screen looks like:



Cursor

- ☐ more than one cursor.
- ☐ won't move.
- ☐ is missing.
- ☐ is too short or too long.
- ☐ is normal but display is blank.
- ☐ is in wrong place (not below characters).

Nothing displays on screen:

- ☐ Is completely blank.
- ☐ Is glowing brightly.
- ☐ Image is too bright or too dim and cannot be adjusted.

Instructions for Checking Basic Test Pattern, EBCDIC No. 23 or ASCII No. 29

The display image should appear with the cursor located under the character C in the second row of displayed data. No indicators should be on.

1. Key in the row of alphabetic characters and the one space exactly as they appear in the row above. All characters should enter correctly, and cursor should move under I after Space bar is pressed.
2. Move cursor under C of CK in second row of displayed data, using → (right) key.
3. Press INS MODE key. INSERT MODE indicator should light.
4. Press A key. Field should now appear A<u>C</u>K.
5. Press FIELD MARK key. (Use B key on Operator Console keyboard.) Field should now appear A;<u>C</u>K (AB<u>C</u>K).
6. Press C key. The data should not change, but the INPUT INHIBITED indicator should come on (in addition to the INSERT MODE indicator, which has remained on).
7. Press RESET key. Both indicators should go out.
8. Press DEL key. The C should disappear, and the field should now appear A;K(ABK).
9. Press ← key (New Line). Cursor should move under C character in fourth row of displayed data.
10. Enter the special characters as they appear in the row above, shifting where required. Cursor should appear under 0 character after last special character entered.
11. Enter the digits 0 through 9 and the characters, . - and A as they appear in the row above. (On Data Entry keyboards, use the , over * and . over $ keys to enter the , and . characters.) The following results should occur:

    a. Typewriter and Operator Console keyboards without Numeric Lock feature – all characters should enter.
    b. Data Entry keyboard without Numeric Lock feature – characters , . and - enter normally; the A character enters as < symbol.
    c. All keyboards with Numeric Lock feature – characters . and – enter normally; keyboard should lock and INPUT INHIBITED should light when , and A keys are pressed. (Use Reset and → keys to move cursor from those positions.)

12. Check ↑ (Up), ↓ (Down), and ← (Backspace) cursor move keys for proper operation.
13. Check the typamatic function of the Space bar or any other key with typamatic capability. Use the first field in the fourth row of displayed data for this step.
14. Move cursor under first character displayed of test message.
15. Press any alphameric key. INPUT INHIBITED indicator should come on, and character should not enter or display because field is designated as a protected data field.
16. Press RESET key. INPUT INHIBITED indicator should go out.
17. Press ENTER key. INPUT INHIBITED indicator should light, and keyboard should lock.
18. Press RESET key. INPUT INHIBITED indicator should go out, and keyboard should unlock.

    NOTE: The following steps check tab, DUP, and new line functions.

19. Press → (Tab) key. Cursor should appear under character A in second row of characters.
20. Press DUP key. An asterisk (*) should appear in cursor position, and cursor should move under I of INSERT. (On Operator Console keyboard, use Tab key; cursor should move under I of INSERT, but the asterisk should not appear.)
21. Space one character position. The I should disappear.
22. Press ← (Backtab) key. Cursor should move back one space to where the I was formerly located.
23. Press Tab key. (Use SKIP key on Data Entry keyboards.) The cursor should appear in the first character position of the fourth row of displayed data.

NOTE: The following steps test the erase and clear functions.

24. Position cursor under character E in second row of displayed data.
25. Press ERASE EOF key. Characters E through Z should disappear, and cursor should not move.
26. Press ERASE INPUT key. All unprotected data, including keyed-in characters and field that originally appeared as INSERT CK should disappear from screen.
27. If display station being tested has a selector light-pen attached, continue with step 28. If a pen is not attached, press CLEAR key. All characters remaining on screen should disappear, and cursor should reappear in first character position in first row. Press RESET key, and enter the next test message (steps 1–7 of "General Instructions").
28. Fire pen on detectable field that has a question mark (?) as its first character. Question mark should change to a greater-than (>) symbol. Remainder of field should not change.
29. Fire pen again on the field. The greater-than symbol should change back to a question mark. Remainder of field should not change.
30. Fire pen on next detectable field that has a greater-than symbol as its first character. The greater-than symbol should change to a question mark. Remainder of field should not change.
31. Fire pen again on same field. Question mark should change back to a greater-than symbol. Remainder of field should not change.
32. Press CLEAR key. All characters on screen should disappear, and cursor should move to character location 0. Press RESET key, and enter the next test message (steps 1–7 of "General Instructions").

Section 6 Contents

DOS/VS System Utilities

Source: GC33-5381 "DOS/VS System Utilities, Release 29"

This section contains information on a few of the frequently used DOS Utility programs. Refer to the SRL for complete information.

Assign Alternate Track Data Cell

Purposes:

- To assign an alternate track on an IBM 2321 Data Cell Drive. If an alternate track is found defective, a new alternate track must be assigned to the primary track.
- To recopy data from the alternate track to the primary track if this track is no longer defective.
- To replace bad records on a specified track if update records are supplied as input.

Assign Alternate Track Disk

Purposes:

- To assign an alternate track on an IBM 2311 Disk Storage Drive, an IBM 2314 Direct Access Storage Facility, an IBM 2319 Disk Storage, an IBM 3330 Disk Storage, an IBM 3333 Disk Storage, or an IBM 3340 Direct Access Storage Facility, and to copy data (if present) from a defective track to an alternate track.

  If an alternate track is found to be defective, a new alternate track must be assigned to the primary track.

  To replace bad records on a specified track if update records are supplied as input.

- To change the track-condition indication, and to recopy data (if present) from the alternate track to the primary track.

  Restriction: This is only valid for the 2311, the 2314, and 2319.

Clear Data cell

Purposes:

- To clear one or more areas on an IBM 2321 Data Cell Drive.
- To establish preformatted tracks throughout the area cleared.
- To create a file label in the VTOC.

Clear Disk

Purposes:

- To establish preformatted tracks (clear) on one or more extents on an IBM 2311 Disk Storage Drive, an IBM 2314 Direct Access Storage Facility, an IBM 2319 Disk Storage, an IBM 3330 Disk Storage, an IBM 3333 Disk Storage, or an IBM 3340 Direct Access Storage Facility.
- To create a file label in the VTOC.

Copy and Restore Disk or Data Cell

Purposes:

- To copy a volume or file from an IBM 2311 Disk Storage Drive, an IBM 2314 Direct Access Storage Facility, an IBM 2319 Disk Storage, an IBM 3330 Disk Storage, an IBM 3333 Disk Storage, or an IBM 3340 Direct Access Storage Facility, to cards, disk, or tape.
- To copy a volume or file from an IBM 2321 Data Cell Drive to tape.
- To restore data to disk or data cell at a later date.

Copy and Restore Diskette

Purposes:

- To replace bad labels on an IBM 3540 Diskette Input/Output Unit.
- To copy the entire contents of a diskette onto another diskette.
- To eliminate the special records from all data files.
- To create a backup copy.

Deblock

Purposes:

- To block an 80/81-byte record file to a 3440-byte record file.
- To deblock a blocked 3440-byte file in order to create an 80-byte SYSIN file.
- To copy files.
- To print (list) job control statements and comments from a blocked input file.
- To select records (or a group of records) from a blocked 3440-byte file in order to create an 80-byte SYSIN file.

Fast Copy Disk Volume

- To copy the entire contents of an IBM 3330 Disk Storage, an IBM 3333 Disk Storage, or an IBM 3340 Direct Access Storage Facility onto another disk device of the same type in a short time. The pack to be copied may contain any combination of DOS/VS data sets and system components.

  The contents of this disk may be copied directly to another disk device, or it may be written on magnetic tape, to be restored at a later time.

Initialize Data Cell

Purpose:

- To prepare from one to five new or expired cells for use on an IBM 2321 Data Cell Drive.

Initialize Disk

Purpose:

- To prepare one complete disk pack for use on an IBM 2311 Disk Storage Drive, an IBM 2314 Direct Access Storage Facility, an IBM 2319 Disk Storage, an IBM 3330 Disk Storage, an IBM 3333 Disk Storage, or an IBM 3340 Direct Access Storage Facility.

  The program can also be used:

- To change the volume label(s) and the VTOC (volume table of contents) address of a previously initialized disk pack (other than an emulator pack).

  If you specify IS in the input option parameter of the utility modifier statement, surface analysis, HA (home address), and RO (track descriptor record) generation are bypassed. This option assumes that a valid VTOC is present. A workpack used for OS can therefore be converted into a work-pack suitable to be used for DOS/VS.

Initialize Tape

Purposes:

- To write one to eight IBM standard tape volume labels in numerical sequence, followed by one dummy header label and one tapemark on EBCDIC tapes.

Print Hardcopy File (Printlog) — Models 115 and 125

Purpose:

- To print on SYSLST the hardcopy file from an IBM 3330 Disk Storage, an IBM 3333 Disk Storage, or an IBM 3340 Direct Access Storage Facility.

VTOC Display

Purpose:

- To display the labels contained in the VTOC of a disk pack on an IBM 2311 Disk Storage Drive, an IBM 2314 Direct Access Storage Facility, an IBM 2319 Disk Storage, an IBM 3330 Disk Storage, an IBM 3333 Disk Storage, an IBM 3340 Direct Access Storage Facility, or of a data cell on an IBM 2321 Data Cell Drive.

Field Developed Program

DOS/DITTO (Program No. 5798-ARN)

Purpose:

- DOS/DITTO is a general-purpose utility program containing 37 utility functions for Unit Record, Tape, and Disk I/O units.

UTILITY PROGRAMS – CONTROL STATEMENT STREAMS

Parts in boldface are invariable. Replace light type as required by your application. Refer to GC33-5381 for a description of parameters and utility function codes.

INITIALIZE DATA CELL

```
// JOB INITIAL
// ASSIGN SYS000,X'293'
// EXEC INTDC
// UIM CELLS=(3,5,7)
// VTOC STRTADR=(3033303),EXTENT=(5)
VOL1222222
// END
// VTOC STANDARD
VOL1333333
// END
// VTOC STANDARD
VOL1444444
// END
/&
```

INITIALIZE DISK

```
// JOB INITIAL
// ASSGN SYS000,X'191'
// EXEC INTDK
// UID IR,C1,R=(0027003) (not valid for 3330/3333)
// VTOC STANDARD
VOL1111111
//    END
/&
```

NOTE: When you initialize an IBM 2311, 2314 or 2319 disk pack to be used as a stacked disk pack by the 1401/1440 System/370 Emulators (program number SCEML 5745); you must include an UPSI card immediately before the EXEC card in the control statement stream. This UPSI card must have the following format:

```
// UPSI 00000001
```

This card allows cylinder 200 to be used for emulator data instead of being part of the alternate track area.

Restriction: You cannot use the UPSI card for the IBM 3330, 3333, and 3340.

INITIALIZE TAPE

This job stream is used to initialize an ASCII tape without the card image option.

```
// JOB INITIAL
// ASSGN SYS000,X'181'
// ASSGN SYS001,UA (no checkpoints)
// EXEC INTTP
// INTT REWIND,A,SERIAL=(000001),P=(1),
   CODE=(AB COMPANY NYC)
/&
```

This job stream is used to initialize an ASCII tape with the card image option.

```
// JOB INITIAL
// ASSGN SYS000,X'181'
// ASSGN SYS001,X'182'
// ASSGN SYS002,UA (no checkpoints)
// EXEC INTTP
// INTT CARD, A                                    (column 80)
VOL1000001          AB COMPANY NYC          1
// END
VOL1000002          AB COMPANY NYC          1
// END
/&
```

It is assumed that in each example SYSLOG is permanently assigned.

FAST COPY DISK VOLUME

1. Copy Disk to Disk

```
// JOB COPY 3330 to 3330
// ASSGN SYS004,X'160'          (input disk)
// ASSGN SYS005,X'161'          (output disk)
// EXEC FCOPY,REAL
// UDD IV=DOSR29
/&
```

2. Copy Disk to Tape

```
// JOB COPY 3340 TO TAPE
// ASSGN SYS004,X'160'          (input disk)
// ASSGN SYS005,X'280'          (output tape)
// ASSGN SYS005,X'281',ALT      (alternate tape)
// TLBL UOUT,'BACKUP TAPE'
// EXEC FCOPY,REAL
// UDT IV=111111
/&
```

3. Copy Tape to Disk

```
// JOB RESTORE BACKUP TAPE TO DISK
// ASSGN SYS004,X'280'          (input tape)
// ASSGN SYS004,X'281',ALT      (alternate tape)
// ASSGN SYS005,X'160'          (output disk)
// TLBL UIN,'BACKUP TAPE'
// EXEC FCOPY,REAL
// UTD
/&
```

PRINTLOG

```
// JOB NAME
// EXEC PRINTLOG
```

VTOC DISPLAY

```
// JOB VTOC
// ASSGN SYS004,X'191'
// ASSGN SYS005,X'00E'
// PAUSE REPLY NO IF MSG 8V96D IS ISSUED
// EXEC LVTOC
/&
```

It is not necessary to use a utility modifier card for the VTOC display program.

FDP Utility: Ditto

Source: SB21-0786 DOS/DITTO Program Number: 5798-ARN

Ditto is a self-prompting conversational program. The DITTO utility can be executed from cards or at the console. To execute DITTO from the console, enter:

```
// JOB Anyname
// EXEC DITTO
```

The program responds with: DITTO FUNCTION.

Type the appropriate utility function code. If you are at a console and don't know the function code, type xxx in response to the DITTO FUNCTION message. You will get this list of DITTO functions and their function codes.

DOS/DITTO

Function Codes	Card Functions
CC	CARD TO CARD
CCS	CARD TO CARD WITH SEQ. NUMBERS AND DECK NAME
CP	CARD TO PRINTER IN CHARACTER FORMAT
CD	CARD TO PRINTER IN CHARACTER AND HEX DUMP FORMAT
CT	CARD TO TAPE BLOCKED 1 TO 400
CTS	CARD TO TAPE RESEQUENCED

Tape Functions

TC	TAPE TO CARD BLOCKED OR UNBLOCKED
TP	TAPE TO PRINTER UNBLOCKED IN CHAR. FORMAT
TPD	TAPE TO PRINTER DEBLOCKED IN CHAR. FORMAT
TD	TAPE TO PRINTER UNBLOCKED IN CHAR. AND HEX DUMP
TDD	TAPE TO PRINTER DEBLOCKED IN CHAR. AND HEX DUMP
TPV	TAPE TO PRINTER VARIABLE RECDS CHAR. FORMAT
TDV	TAPE TO PRINTER VARIABLE RECDS CHAR. AND HEX DUMP
TFA	PRINT SYSLST TAPES TYPE A FORMS CONTROL, CCW CODE
TFD	PRINT SYSLST TAPES TYPE D FORMS CONTROL
TRS	TAPE RECORD SCAN
TRL	TAPE RECORD LOAD
INT	INITIALIZE TAPE
TT	TAPE TO TAPE (01 to 99) FILES
TTR	TAPE TO TAPE REBLOCKED
WTM	WRITE TAPE MARK
REW	REWIND TAPE
RUN	REWIND AND UNLOAD TAPE
FSR	FORWARD SPACE RECORD
BSR	BACK SPACE RECORD
FSF	FORWARD SPACE FILE
BSF	BACK SPACE FILE
ERT	ERASE TAPE (DATA SECURITY ERASE 3410/3420 ONLY)

Disk Functions

DP	DISK TO PRINTER UNBLOCKED IN CHAR. FORMAT
DD	DISK TO PRINTER UNBLOCKED IN CHAR. AND HEX DUMP
DPD	DISK TO PRINTER DEBLOCKED IN CHAR. FORMAT
DDD	DISK TO PRINTER DEBLOCKED IN CHAR. AND HEX DUMP
DRL	DISK RECORD LOAD – KEY AND/OR DATA
DRS	DISK RECORD SCAN – PARTIAL KEY OR DATA OR EOF
EOF	WRITE DISK EOF RECORD
DID	ALTER DISK IDENTIFICATION VOLUME NUMBER
XXX	LIST FUNCTIONS ON SYSLST
EOJ	END OF JOB

If the function involves tape, the DITTO program will request the input and output drive numbers and the number of files. If it is a disk to printer function, the DITTO program will ask you to identify the disk by number.

When the function is completed, DITTO again types: DITTO FUNCTION.
Type in another utility code, or EOJ if finished with DITTO.

System Utility Programs

System utility programs manipulate collections of data and system control information. The system utility programs are:

- IEHATLAS, which is used to assign alternate tracks when defective tracks are indicated.
- IEHDASDR, which is used to initialize direct access volumes or to dump or restore data.
- IEHINITT, which is used to write standard labels on tape volumes.
- IEHIOSUP, which is used to update entries in the supervisor call library (VS1 only).
- IEHLIST, which is used to list system control data.
- IEHMOVE, which is used to move or copy collections of data.
- IEHPROGM, which is used to build and maintain system control data.
- IEHUCAT, which is used to update an OS catalog to the level of a VSAM catalog (non-VSAM data sets). (VS1 only)
- IFHSTATR, which is used to select, format, and write information about tape errors from the IFASMFDP tape or the SYS1.MAN data set.

A system utility program is executed or invoked through the use of job control statements and utility control statements.

DATA SET UTILITY PROGRAMS

Data set utility programs manipulate partitioned, sequential, or indexed sequential data sets provided as input to the programs. Data ranging from fields within a logical record to entire data sets can be manipulated. The data set utility programs are:

- IEBCOMPR, which is used to compare records in sequential or partitioned data sets.
- IEBCOPY, which is used to copy, compress, or merge partitioned data sets, to select or exclude specified members in a copy operation, and to rename and/or replace selected members of partitioned data sets.
- IEBDG, which is used to create a test data set consisting of patterned data.
- IEBEDIT, which is used to selectively copy job steps and their associated JOB statements.
- IEBGENER, which is used to copy records from a sequential data set or to convert a data set from sequential organization to partitioned organization.
- IEBISAM, which is used to place source data from an indexed sequential data set into a sequential data set in a format suitable for subsequent reconstruction.
- IEBPTPCH, which is used to print or punch records that reside in a sequential or partitioned data set.
- IEBTCRIN, which is used to construct records from the input data stream that have been read from the IBM 2495 Tape Cartridge Reader.
- IEBUPDTE, which is used to incorporate changes to sequential or partitioned data sets.

Data Set utility programs can be executed as jobs or can be invoked as subroutines by a calling program.

INDEPENDENT UTILITY PROGRAMS

Independent utility programs operate outside, and in support of, the operating system. They are not supported, however, by the 3066 console, which is only used with the Model 165, System/370. If the 3066 is the only console available, execute independent utilities by following step 3b "Executing IDCDASDI and IBCDMPRS" below. The independent utility programs are:

- IBCDASDI, which is used to initialize a direct access volume and to assign alternate tracks.
- IBCDMPRS, which is used to dump and restore the data contents of a direct access volume.
- ICAPRTBL, which is used to load the forms control and Universal Character Set buffers of a 3211 after an unsuccessful attempt to IPL, with the 3211 printer assigned as the output portion of a composite console.

Guide to Utility Program Functions

Source: GC35-0005-2 OS/VS Utilities

This table shows a list of tasks that the utility programs can be used to perform. The left-hand column shows tasks that you might want to perform. The middle column defines the tasks more specifically. The right-hand column shows the utility programs that can be used for each task. Notice that in some cases more than one program may be available to perform the same task.

TASKS AND UTILITY PROGRAMS

Task		Utility Program
Add	a password	IEHPROGM
Analyze	tracks on direct access	IEHATLAS,IEHDASDR,IBCDASDI
Assign alternate tracks	to a direct access volume	IEHATLAS,IEHDASDR,IBCDASDI
Build	a generation index	VS1 ONLY—IEHPROGM
	a generation	VS1 ONLY—IEHPROGM
	an index	VS1 ONLY—IEHPROGM
Catalog	a data set	IEHPROGM
	a generation data set	VS1 ONLY—IEHPROGM
Change	data set organization	IEBUPDTE
	logical record length	IEBGENER
	volume serial number of direct access volume	IEHDASDR
Compare	a partitioned data set	IEBCOMPR
	sequential data sets	IEBCOMPR
Compress-in-place	a partitioned data set	IEBCOPY
Connect	volumes	VS1 ONLY—IEHPROGM
Construct	records from MTST and MTDI input	IEBTCRIN
Convert to partitioned	a sequential data set created as a result of an unload	IEBCOPY
	sequential data sets	IEBUPDTE,IEBGENER
Convert to sequential	a partitioned data set	IEBUPDTE,IEBCOPY
	an indexed sequential data set	IEBISAM,IEBDG
Copy	a catalog	VS1 ONLY—IEHMOVE
	a direct access volume	IEHDASDR,IBCDMPRS,IEHMOVE
	a partitioned data set	IEBCOPY,IEHMOVE
	a volume of data sets	IEHMOVE
	an indexed sequential data set	IEBISAM
	cataloged data sets	VS1 ONLY—IEHMOVE
	dumped data from tape to direct access	IEHDASDR,IBCDMPRS
	job steps	IEBEDIT
	members	IEBGENER,IEBUPDTE,IEBDG
	selected members	IEBCOPY,IEHMOVE
	sequential data sets	IEBGENER,IEHMOVE,IEBUPDTE
	to tape	IBCDMPRS
Create	a library of partitioned members	IEBUPDTE
	a member	IEBDG
	a sequential output data set	IEBDG
	an index	VS1 ONLY—IEHPROGM
	an output job stream	IEBEDIT
Delete	a password	IEHPROGM
	an index structure	VS1 ONLY—IEHPROGM
	records in a partitioned data set	IEBUPDTE
Dump	a direct access volume	IEHDASDR,IBCDMPRS
Edit	MTDI input (Magnetic Data Inscriber)	IEBTCRIN
Edit and convert to partitioned	a sequential data set	IEBGENER,IEBUPDTE
Edit and copy	a job stream	IEBEDIT
	a sequential data set	IEBGENER,IEBUPDTE
Edit and list	error statistics by volume (ESV) records	IEHSTATR
Edit and print	a sequential data set	IEBPTPCH
Edit and punch	a sequential data set	IEBPTPCH
Enter	a procedure into a procedure library	IEBUPDTE
Exclude	a partitioned data set member from a copy operation	IEBCOPY,IEHMOVE

Guide to Utility Program Functions (cont'd)

Task		Utility Program
Expand	a partitioned data set	IEBCOPY
	a sequential data set	IEBGENER
Generate	test data	IEBDG
Get alternate tracks	on a direct access volume	IEHDASDR,IBCDASDI,IEHATLAS
Include	changes to members or sequential data sets	IEBUPDTE
Initialize	a direct access volume	IEHDASDR,IBCDASDI
Insert records	into a partitioned data set	IEBUPDTE
Label	magnetic tape volumes	IEHINITT
List	a password entry	IEHPROGM
	a volume table of contents	IEHLIST
	contents of direct access volume on system output device	IEHDASDR
	number of unused directory blocks and tracks	IEBCOPY
	partitioned directories	IEHLIST
	the contents of the catalog (SYSCTLG data set)	VS1 ONLY–IEHLIST
Load	a previously unloaded partitioned data set	IEBCOPY
	an indexed sequential data set	IEBISAM
	an unloaded data set	IEHMOVE
	UCS and FCB buffers of a 3211	ICAPRTBL
Merge	partitioned data sets	IEHMOVE,IEBCOPY
Modify	a partitioned or sequential data set	IEBUPDTE
Move	a catalog	VS1 ONLY-IEHMOVE
	a volume of data sets	IEHMOVE
	cataloged data sets	VS1 ONLY–IEHMOVE
	partitioned data sets	IEHMOVE
	sequential data sets	IEHMOVE
Number records	in a new member	IEBUPDTE
	in a partitioned data set	IEBUPDTE
Password protect	add a password	IEHPROGM
	delete a password	IEHPROGM
	list passwords	IEHPROGM
	replace a password	IEHPROGM
Print	a sequential data set	IEBGENER,IEBUPDTE,IEBPTPCH
	partitioned data sets	IEBPTPCH
	selected records	IEBPTPCH
Punch	a partitioned data set member	IEBPTPCH
	a sequential data set	IEBPTPCH
	selected records	IEBPTPCH
Read	Tape Cartridge Reader input	IEBTCRIN
Reblock	a partitioned data set	IEBCOPY
	a sequential data set	IEBGENER,IEBUPDTE
Recover	data from defective tracks on direct access volumes	IEHATLAS
Release	a connected volume	VS1 ONLY–IEHPROGM
Rename	a partitioned data set member	IEBCOPY,IEHPROGM
	a sequential or partitioned data set	IEHPROGM
	moved or copied members	IEHMOVE
Renumber	logical records	IEBUPDTE
Replace	a password	IEHPROGM
	data on an alternate track	IEHATLAS
	identically named members	IEBCOPY
	logical records	IEBUPDTE
	members	IEBUPDTE
	records in a member	IEBUPDTE
	records in a partitioned data set	IEBUPDTE,IEBCOPY
	selected members	IEBCOPY
	selected members in a move or copy operation	IEBCOPY,IEHMOVE

OS/VS Utilities (cont'd)

Task		Utility Program
Restore	a dumped direct access volume from tape	IBCDMPRS,IEHDASDR
Scratch	a volume table of contents	IEHPROGM
	data sets	IEHPROGM
Uncatalog	data sets	IEHPROGM
Unload	a partitioned data set	IEHMOVE,IEBCOPY
	a sequential data set	IEHMOVE
	an indexed sequential data set	IEBISAM
Update	a catalog to VS2 Release 2 level	VS1 ONLY–IEHUCAT
	in place a partitioned data set	IEBUPDTE
	TTR entries in the supervisor call library	IEHIOSUP
Write	IPL records and a program on a direct access volume	IBCDASDI,IEHDASDR

OS/VS EXECUTING A SYSTEM UTILITY PROGRAM

```
/*
// SYSIN (DD statement for the data set containing utility statements)
    DD statements for device allocation
// SYSPRINT (DD statement for the message output data set)
// stepname EXEC PGM = progname
// jobname (JOB statement)
```

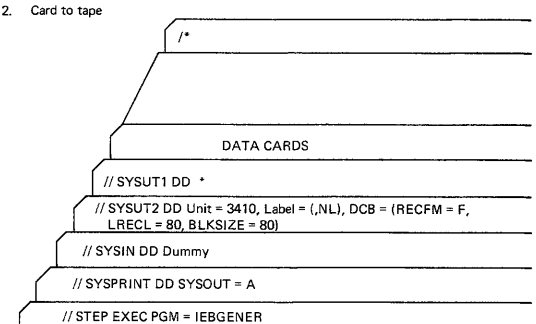
OS/VS UTILITY CONTROL CARD EXAMPLES

1. Card to print

```
/*
    DATA CARDS
//SYSUT1 DD * DATA
//SYSUT2 DD SYSOUT = A,DCB = (RECFM = F, BLKSIZE = 80,
  LRECL = 80, PRTSP = 1)
//SYSIN DD Dummy
//SYSPRINT DD SYSOUT = A
//STEP EXEC PGM=IEBGENER
//CRDPRT JOB
```

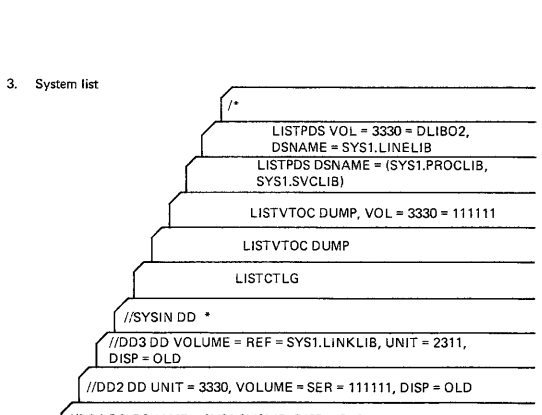
Notes: Place a blank care in front of data cards to prevent overprinting of first card.

2. Card to tape



Notes: Variations in tape unit or label information must be accounted for in sysUT2 card. Blocking may be specified by RECFM = FB or VB and increasing blksize to some multiple of LRECL.

3. System list



Sample Control-Statement Streams

Source: GC35-0005 OS/VS Utilities

A few examples of utility functions and the control statements that must be prepared to execute them follow.

IBCDASDI

In this example, a 3330 volume is initialized for later use as a system residence volume. An IPL program is included in standard TXT format.

The example follows:

```
INIT      JOB  'INITIALIZE 3330'
        MSG TODEV=1403,TOADDR=00E
      DADEF TODEV=3330,TOADDR=150,IPL=YES
        VLD NEWVOLID=P10000,OWNERID=BROWN,ADDLABEL=2
      VTOCD STRTADR=2,EXTENT=7
     IPLTXT

(IPL program text statements)

  END
```

The control statements are discussed below:

- DADEF specifies that a 3330 volume is to be initialized and specifies the channel number and unit number. An IPL program is to be included.
- VLD specifies a volume serial number and owner identification for the volume to be initialized. It also specifies that space is to be allocated for two additional labels.
- VTOCD specifies that the volume table of contents is to begin on track 2 and is to extend over nine tracks.
- IPLTEXT specifies the beginning of IPL program text statements.
- END specifies the end of IPL program text statements. Because IPL text is included, **END** begins in column 2.

IEHDASDR

In this example, alternate tracks are to be assigned for three suspected defective tracks on a 3330 volume.

The example follows:

```
//DASDR3    JOB
//          EXEC    PGM=IEHDASDR
//SYSPRINT  DD      SYSOUT=A
//VOLUME1   DD      UNIT=(3330,,DEFER),DISP=OLD,
// VOLUME=(PRIVATE,,SER=(333000))
//SYSIN     DD      *
        GETALT      TODD=VOLUME1,TRACK=00050011
        GETALT      TODD=VOLUME1,TRACK=00A00007
        GETALT      TODD=VOLUME1,TRACK=01010002
         LABEL      TODD=VOLUME1,NEWVOLID=DISK00,OWNERID=SMITH
/*
```

The control statements are discussed below:

- VOLUME1 DD defines a device that is to contain the 3330 volume (333000).
- SYSIN DD defines the control data set, which follows in the input stream.
- The GETALT statements specify the ddname of the DD statement defining the device on which the 3330 volume is mounted. The GETALT statements specify the relative track addresses of the tracks for which alternates are to be assigned.

- LABEL specifies the ddname of the DD statement defining the device on which the 3330 volume is mounted. The LABEL statement changes the serial number of the 3330 volume from 333000 to DISK00.

IEBISAM

In this example, an unloaded data set is to be converted to the form of the original indexed sequential data set.

The example follows:

```
//STEPA     JOB     09#770,SMITH
//          EXEC    PGM=IEBISAM,PARM=LOAD
//SYSPRINT  DD      SYSOUT=A
//SYSUT1    DD      DSNAME=INDSEQ,DISP=(,KEEP),DCB=(DSORG=IS),
// DISP=(OLD,KEEP),VOLUME=SER=001234
//SYSUT2    DD      DSNAME=INDSEQ,DISP=('KEEP),DCB=(DSORG=IS),
// SPACE=(CYL,(1)),VOLUME=SER=111112,UNIT=2314
/*
```

The control statements are discussed below:

- EXEC specifies the program name and the LOAD operation.
- SYSUT1 DD defines the input data set, which is a sequential (unloaded) data set. The data set is the second data set on a 9-track tape volume.
- SYSUT2 DD defines the output data set, which is an indexed sequential data set. One cylinder of space is allocated for the data set on a 2314 volume.

IEHLIST

In this example, a volume table of contents, in edited form, is to be listed. The edited listing is supplemented by an unedited listing of selected data set control blocks.

The example follows:

```
//LISTVTOC  JOB     09#550,BLUE
//          EXEC    PGM=IEHLIST
//SYSPRINT  DD      SYSOUT=A
//DD2       DD      UNIT=2314,VOLUME=SER=231400,DISP=OLD
//SYSIN     DD      *
      LISTVTOC      FORMAT,VOL=2314=231400
      LISTVTOC      DUMP,VOL=2314=231400,DSNAME=(SET1,SET2,SET3)
/*
```

The control statements are discussed below:

- DD2 DD defines a mountable device on which the volume containing the specified volume table of contents is to be mounted.
- SYSIN DD defines the control data set which follows in the input stream.
- The first LISTVTOC statement indicates that the volume table of contents on the specified 2314 volume is to be listed in edited form.
- The second LISTVTOC statement indicates that the data set control blocks representing data sets SET1, SET2, and SET3 are to be listed in unedited form.

Sample Control-Statement Streams (cont'd)

IEHMOVE

In this example, a volume of data sets is to be moved to a 2314 volume. All data sets that are successfully moved are scratched from the source volume; however, any catalog entries pertaining to those data sets are not changed. Space is allocated by IEHMOVE. The work data set is deleted when the job step is completed.

The example follows:

```
//MOVEVOL  JOB     09#550,GREEN
//        EXEC     PGM=IEHMOVE
//SYSPRINT DD      SYSOUT=A
//SYSUT1   DD      UNIT=2314,VOLUME=SER=231400,DISP=OLD
//DD1      DD      UNIT=3330,VOLUME=SER=111111,DISP=OLD
//DD2      DD      UNIT=2314,VOLUME=SER=231400,DISP=OLD
//DD3      DD      UNIT=2314,VOLUME=SER=231401,DISP=OLD
//SYSIN    DD      *
         MOVE     VOLUME=2314=231401,TO=2314=231400,PASSWORD
/*
```

The control statements are discussed below:

- SYSUT1 DD defines the device that is to contain the work data set. The work data set is removed from the receiving volume when the job step is completed.
- DD1 DD defines the system residence device.
- DD2 DD defines the mountable device on which the receiving volume is to be mounted.
- DD3 DD defines a mountable device on which the source volume is to be mounted.
- SYSIN DD defines the control data set, which follows in the input stream.
- MOVE specifies a move operation for a volume of data sets and defines the source and receiving volumes. This statement also indicates that password-protected data sets are to be included in the operation.

NOTE: IEHPROGM can be used to uncatalog catalog entries pertaining to source data sets and to catalog the moved versions of those data sets.

IEBPTPCH

In this example, a sequential data set is to be punched according to standard specifications. The input data set resides on a 7-track tape volume, originally written at a density of 556 bits per inch. The punched output is converted to hexadecimal.

The example follows:

```
//PUNCHSET JOB     09#660,SMITH
//        EXEC     PGM=IEBPTPCH
//SYSPRINT DD      SYSOUT=A
//SYSUT1   DD      DSNAME=INSET,UNIT=2400,VOLUME=SER=001234,
// LABEL=(,NL),DISP=(OLD,KEEP),DCB=(DEN=1,RECFM=FB,
// LRECL=80,BLKSIZE=2000,TRTCH=C)
//SYSUT2   DD      UNIT=2540-2
//SYSIN    DD      *
     PUNCH       TOTCONV=XE
     TITLE       ITEM=('PUNCH SEQ DATA SET WITH CONV TO HEX', 10)
/*
```

The control statements are discussed below:

- SYSUT1 DD defines the input data set. The data set contains 80-byte, fixed blocked records.

Sample Control-Statement Streams (cont'd)

- SYSUT2 DD defines the output data set. The data set is to be punched by an IBM 2540-2 Card Read Punch (punch feed). Each record from the input data set is represented by two punched cards.

- SYSIN DD defines the control data set, which follows in the input stream. The control data set contains the PUNCH and TITLE statements.

- PUNCH initiates the punch operation and specifies conversion from alphameric to hexadecimal representation.

- TITLE specifies a title to be placed beginning in column 10. The title is not converted to hexadecimal.

GTF (Generalized Trace Facility)
Traces selected system events such as SVC and I/O interruptions.

JOBQD
Operates as a stand-alone program to format and print the system job queue (SYS1.SYSJOBQE), the incore joblist, the system scheduler work area data set (SYS1.SYSWADS), and the scheduler work area data set (SWADS).

LIST
Formats and prints object modules, load modules, and CSECT identification records. Maps nucleus and link pack area.

OSJQD
Operates as a problem program to format and print the system job queue (SYS1.SYSJOBQE), the incore joblist, the system scheduler work area data set (SYS1.SYSWADS), and the scheduler work area data set (SWADS).

PRDMP
Formats and prints SADMP high-speed output (including page dump), SYS1.DUMP data set, and GTF trace data.

PTFLE
Application function: Applies PTF by generating input to the linkage editor, then invoking the linkage editor. Generate function: Generates JCL and control statements needed to apply PTFs or ICRs in a later step.

SADMP
Operates as a stand-alone program to produce a high-speed or low-speed dump of real storage. The high-speed version also dumps the page data set.

SPZAP
Verifies and/or replaces data in a load module.

How to Set Up an OLTEP Run

Source: GC28-0666 OS/VS1 OLTEP

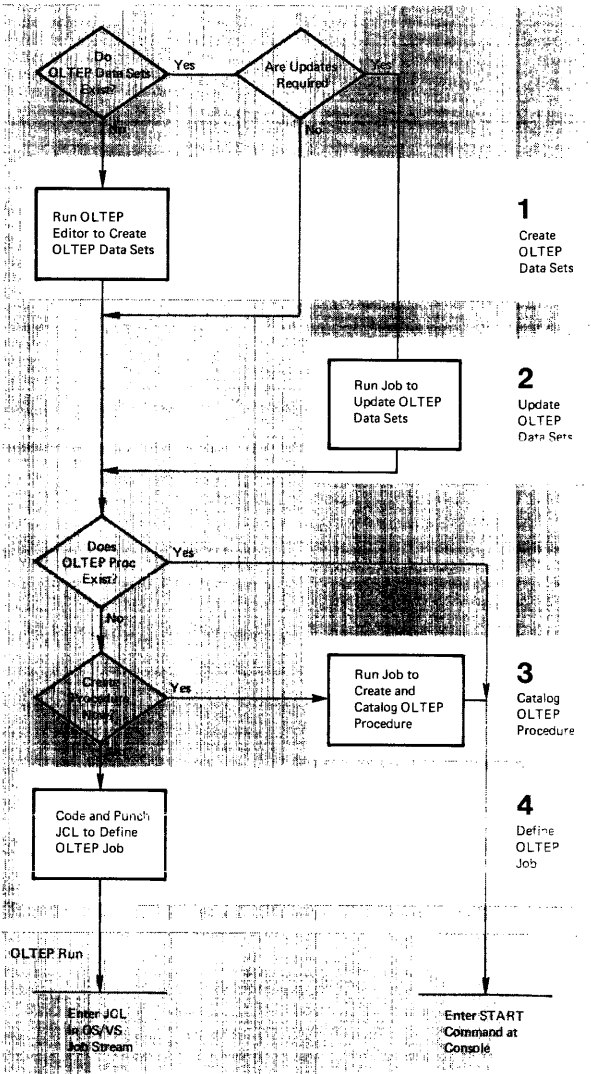
1. Create OLTEP Data Sets: Run the OLTEP Editor Program to create a data set of online test programs and system configuration data. If you intend to test remote teleprocessing terminals, create a second data set containing configuration data for these symbolically named units. All configuration data, for both local devices and remote terminals, is supplied by IBM Field Engineering.

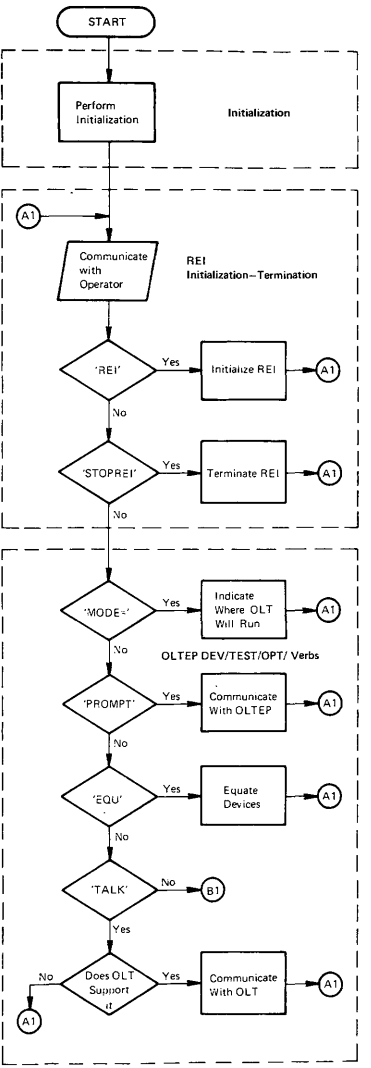
2. Modify OLTEP Data Sets: Use the OLTEP Punch program to obtain a punch-card copy of a member of the data set that needs to be modified. Then, using REP cards to make the desired changes, replace the member in the OLTEP data set by running the OLTEP Editor.

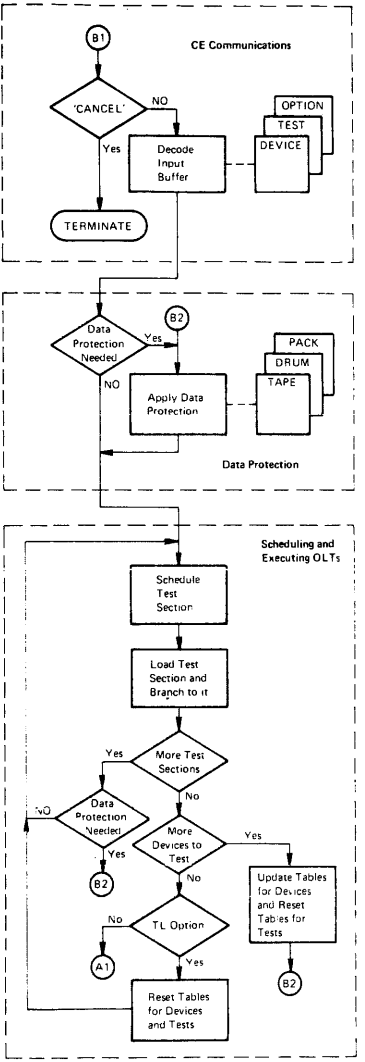
3. Catalog an OLTEP Procedure: Run the IEBUPDTE utility program to create and catalog an OLTEP procedure. Then, to run OLTEP, enter a START command at the console referring to the OLTEP procedure.

4. Define an OLTEP Job: If the START command will not be used to run OLTEP, code and punch JCL (job control statements) to define OLTEP as an OS/VS job. Then, to run OLTEP, enter the JCL in the OS/VS job stream. Optionally, include OLTEP control statements with your JCL to define some or all of the tests you want to run.

How to Set Up an OLTEP Run




START
Perform Initialization
Initialization
A1
Communicate with Operator
REI
Initialization–Termination
'REI'
Yes
Initialize REI
A1
No
'STOPREI'
Yes
Terminate REI
A1
No
'MODE='
Yes
Indicate Where OLT Will Run
A1
No
OLTEP DEV/TEST/OPT/ Verbs
'PROMPT'
Yes
Communicate With OLTEP
A1
No
'EQU'
Yes
Equate Devices
A1
No
'TALK'
No
B1
Yes
Does OLT Support it
No
A1
Yes
Communicate With OLT
A1


B1
CE Communications
'CANCEL'
NO
Yes
Decode Input Buffer
OPTION
TEST
DEVICE
TERMINATE
Data Protection Needed
Yes
B2
NO
Apply Data Protection
PACK
DRUM
TAPE
Data Protection
Scheduling and Executing OLTs
Schedule Test Section
Load Test Section and Branch to it
Yes
More Test Sections
No
Data Protection Needed
NO
Yes
More Devices to Test
Yes
No
B2
Update Tables for Devices and Reset Tables for Tests
No
TL Option
Yes
A1
B2
Reset Tables for Devices and Tests

Section 7 Contents

Glossary

Sources: SR20-1078 System/360 Operator's Reference Guide
GC33-5380 DOS/VS Service Aids and Procedures
GC20-1699 DP Glossary

NOTE: Asterisk before term indicates American National Standard Institute (ANSI) definition.

a

access method: A technique for moving data between main storage and an input/output device.

address constant: A number, or a symbol representing a number, used in calculating storage addresses.

address translation: The process of changing the address of an item of data or an instruction from its virtual address to its real storage address. See also dynamic address translation.

alias: Another name for a member of a partitioned data set; another entry point of a program.

allocate: Assign a resource to a job or task.

asynchronous: Without regular time relationship; unexpected or unpredictable with respect to the execution of a program's instructions.

attribute: A trait; for example, attributes of data include record length, record format, data set name, associated device type and volume identification, use, creation date, etc.

auxiliary storage: Data storage other than main storage. Synonymous with external storage, secondary storage.

b

basic access method: Any access method in which each input/output statement causes a machine input/output operation to occur. (The primary macro instructions used are READ and WRITE.)

basic control mode: When PSW bit 12 is 0, PSW format and system operation are compatible with standard System/360 operation. This is the basic control mode in which control registers 0, 8, and 14 are available to the system. Abbreviated to BC mode. See also "Extended Control Mode."

batch processing: (See stacked job processing.)

block (records): 1. To group records to conserve storage space or to increase the efficiency of access or processing. 2. A blocked record. 3. A portion of a telecommunications message defined as a unit of data transmission.

block loading: Bringing the control section of a load module into adjoining positions of main storage.

BTAM (basic telecommunications access method): A basic access method that permits a READ/WRITE communication with remote devices.

buffer (program input/output): A portion of main storage into which data is read, or from which it is written.

c

catalog: 1. The collection of all data set indexes maintained by data management. 2. To include the volume identification of a data set in the catalog. 3. In DOS to add a program to a library.

cataloged data set: A data set that is represented in an index or series of indexes.

cataloged procedure: A set of job control statements in the SYS1.PROCLIB data set. The procedure can be used by naming it in an execute (EXEC) statement.

CAW (channel address word): A word in main storage at location 72 that specifies the location in main storage where a channel program begins.

CCW (channel command word): A double word at the location in main storage specified by the CAW. One or more CCWs make up the channel program that directs channel operations.

CE pack: A disk pack used to test an IBM 2314, or 3330. It has an R0 data length of 6 at any location other than cylinder 0, track 0.

CE volume: If the device is a 2314 or 3330, see CE pack.

channel: A hardware device that connects the CPU and main storage with the I/O control units.

channel program: One or more Channel Command Words (CCWs) that control(s) a specific sequence of channel operations. Execution of the specific sequence is initiated by a single start I/O instruction.

channel program translation: In a channel program, replacement, by software, of virtual addresses with real addresses.

CIL: Core Image Library.

command control block (CCB): Under DOS and TOS, a 16-byte field required for each channel program executed by physical IOCS. This field is used for communication between physical IOCS and the problem program.

communication region: Under DOS and TOS, an area of the supervisor set aside for interprogram and intraprogram communication. It contains information useful to both the supervisor and the problem program. Abbreviated comreg. (Not to be confused with the COMRG macro instruction).

communications interval: A period of communication between the console operator and OLTEP. The operator is requested by OLTEP to enter the test–run definition at this time.

concatenated data set: A group of logically connected data sets.

Configuration Data Set (CDS): A record of information about an I/O device or CPU accessed by OLTEP and the CLT.

control blocks: A storage area used by the operating system to hold control information.

control dictionary: The external symbol dictionary and relocation dictionary, collectively, of an object or load module.

control program: The routines in the operating system that manage resources, implement data organization and communications conventions, or contain privileged operations.

control registers: In S/370, a set of registers used for operating system control of relocation, priority interruption, program event recording, error recovery, and masking operations.

control section: That part of a program specified by the programmer to be a relocatable unit, all of which is to be loaded into adjoining main storage locations.

control volume: A volume that contains one or more indexes of the catalog.

core–wrap mode: The method of operation that records the events of a trace in the PD area or an alternate area (used by PDAIDS). It is the default process when no output device for a PDAID trace has been specified.

CPU (central processing unit): The unit of a system that contains the circuits that control and perform the execution of instructions.

CRT (Cathode Ray Tube): Visual Display Screen.

CSW (channel status word): A word in main storage at location 64 that provides information about the termination of an input/output operation.

d

data management: Those parts of the control program that provide access to data sets, enforce data storage conventions, and regulate the use of input/output devices.

data organization: The arrangement of a data set.

data protection: A safeguard invoked to prevent the loss or destruction of customer data.

data security: A safeguard invoked to prevent the accessing of customer data.

data set: The major unit of data storage and retrieval in the operating system, consisting of a collection of data in one of several prescribed arrangements and described by control information that the system has access to.

data set control block (DSCB): A data set label for a data set in direct-access storage.

data set label (DSL): A collection of information that describes the attributes of a data set, and that is normally stored with the data set; a general term for data set control blocks and tape data set labels.

default value: A predetermined value used in place of an omitted entry.

deferred entry: An entry into a subroutine that occurs as a result of a deferred exit from the program that passed control to it.

deferred exit: The passing of control to a subroutine at a time determined by an asynchronous event rather than at a predictable time.

device independence: The ability to request input/output operations without regard to the characteristics of the input/output devices.

device name: Usually, the general name for a kind of device, specified at the time the system is generated. For example, 2314 or 3330 or TAPE. (See Unit name.)

direct access: Retrieval or storage of data by a reference to its location on a volume, rather than relative to the previously retrieved or stored data.

diskette: A flexible magnetic oxide coated disk, permanently enclosed in a semi–rigid protective plastic jacket approx. 8 inches square. During data processing operations the disk turns freely within the jacket. It is capable of storing 1898 128–character data records.

dispatching priority: A number assigned to tasks to determine the order in which they will use the central processing unit in a multitask situation.

DTF (define the file) macro instruction: A macro instruction that describes the characteristics of a logical input/output file, indicates the type of processing for the file, and specifies the I/O areas and routines to process the file.

dump: (1) To print out the contents of all or part of virtual storage or of auxiliary storage. (2) The data resulting from the process as in (1).

dynamic address translation (DAT): (1) In S/370, the change of a virtual storage address to an address in real storage during execution of an instruction. (2) A hardware feature that performs the translation.

e

emulator: The combination of programming techniques and special machine features that permits a given computing system to execute programs written for another system.

entry point: Any location in a program to which control can be passed by another program.

environmental recording, editing, and printing (EREP): A program that processes the data contained on the system recorder file.

error recovery procedures: Procedures designed to help isolate, and, when possible, to recover from hardware errors in equipment. The procedures are often used in conjunction with programs that record the statistics of machine malfunctions.

error volume analysis (EVA): With this DOS option, the system issues a message to the operator when a number of temporary read or write errors (specified by the user at system generation time) has been exceeded on a currently accessed tape file.

event: An occurrence of significance to a task; typically, the completion of an asynchronous operation, such as input/output.

exchange buffering: A technique using data chaining to avoid moving data in main storage, in which control of buffer segments and user program work areas is passed between data management and the user program.

exclusive segments: Segments in the same region of an overlay program, neither of which is in the path of the other. They cannot be in main storage simultaneously.

execute (EXEC) statement: A job control statement that designates a job step by identifying the load module to be fetched and executed.

expiration date: A date within a tape label for data protection. The tape cannot be used as a scratch tape without permission from the operator until this date has expired.

extent: The physical locations on input/output devices occupied by or reserved for a particular data set.

extended control mode: When PSW bit 12 is set to 1, the PSW format is changed from that used for standard System/360 operation: the channel mask bits, instruction length code, and interruption code are removed, and additional mode and mask bits are included. This is the extended control mode, in which all control registers are available to the system for control of facilities that are particular to System/370. Abbreviated to EC mode. See also "Basic Control Mode."

external reference: A reference to a symbol defined in another module.

external symbol: A control section name, entry point name, or external reference; a symbol contained in the external symbol dictionary.

external symbol dictionary (ESD): Control information associated with an object or load module which identifies the external symbols in the module.

f

F format: A data set record format in which logical records are the same length.

fetch (program): 1. To load requested load modules into main storage, relocating them as necessary. 2. A control routine that accomplished 1.

File Protect Mode (FPM): A mode of operation that insures maximum protection and security of customer data. While in file protect mode, the system performs no write operations and reads no customer data.

fixed page: A page in real storage that is not to be paged out.

F/L Trace (Fetch/Load Trace): Under DOS and TOS, a program that records information about phases and transients as they are called from a core image library.

g

generation data group: A collection of successive, historically related data sets.

GPR (General-purpose register): Temporary storage with capacity of one word. There are 16 GPRs on System/370 computers.

GSVC Trace (Generalized Supervisor Calls Trace): A program that records SVC interrupts as they occur. All or a selected group of SVCs can be traced.

h

hard copy: A printed copy of machine output in a visually readable form, for example, a printed recording of the messages displayed on the System/370 Model 125 video display unit.

hard stop: A condition, usually caused by an error, in which the CPU is stopped and is not executing the microprogram.

i

IC (instruction counter): Hardware circuit which tells the central processor (CPU) the main storage address at which it will find the next instruction to execute.

inclusive segments: Overlay segments in the same region that can be in main storage simultaneously.

index (data management): 1. A table in the catalog structure used to locate data sets. 2. A table used to locate the records of an indexed sequential data set.

initial program loading (IPL): The initialization procedure which loads the nucleus and begins normal operations.

initiator: The part of the job scheduler that selects jobs and job steps to be executed, allocates input/output devices for them, places them under task control, and at completion of the job, supplies control information for writing job output on a system output unit.

input queue: A queue of job definitions in direct access storage, assigned to a job class and arranged in assigned priority order, waiting to be processed.

input stream: Job control statements entering the system; may also include input data.

installation: A particular computing system, in terms of the overall work it does and the people who manage it, operate it, apply it to problems, service it, and use the results it produces.

interrupt: A break in the normal sequence of instruction execution. It causes an automatic transfer to a preset storage location where appropriate action is taken.

invalid page: In S/370, a page that cannot be directly addressed by the dynamic address translation feature of the central processing unit.

I/O area: An area (portion) of real storage into which data is read or from which data is written; the term buffer is often used in place of I/O area.

I/O Trace (Input/Output Trace): A program that records I/O device activity for all or a selected group of I/O devices.

IOCS (input/output control system): A group of macro instruction routines provided by IBM for handling the transfer of data between main storage and external storage devices.

irrecoverable error: A hardware error which cannot be recovered from by the normal hardware and retry procedures.

j

job: 1. A unit of work for the system from the standpoint of installation accounting and control. A job consists of one or more job steps. 2. A collection of related problem programs, identified in the input stream by a JOB statement followed by one or more EXEC statements.

job control statement: A control statement in the input stream that identifies a job or defines its needs.

job library: A set of user-identified partitioned data sets used as the main source of load modules for a given job.

job management: A general term for the functions of job scheduling and command processing.

job queue: (See input queue.)

job (JOB) statement: The control statement in the input stream that identifies the beginning of a series of job control statements for a single job.

job step: A unit of work associated with one processing program or one cataloged procedure, and related data.

l

language translator: Any assembler, compiler, or other routine that accepts statements in one language and produces equivalent statements in another language.

library: 1. A collection of objects (for example, data sets, volumes, card decks) associated with a particular use, and identified in a directory. See job library, link library, system library. 2. Any partitioned data set.

limit priority: In OS/VS2 and MVT, a number associated with a task in a multitask operation, representing the highest dispatching priority that the task can assign to itself or to any of its subtasks.

link library: A partitioned data set which, unless otherwise specified, is used in fetching load modules referred to in execute (EXEC) statements and in ATTACH, LINK, LOAD, and XCTL macro instructions.

linkage: The coding that connects two separately coded routines.

linkage editor: A program that produces a load module by changing object modules into a form acceptable to fetch, combining object modules and load modules into a single new load module, resolving symbolic cross references among them, replacing, deleting, and adding control sections automatically on request, and providing overlay facilities for modules requesting them.

load: In programming, to enter instructions or data into storage or working registers. In DOS/VS, to bring a program phase from a core image library into virtual storage for execution.

load module: The output of the linkage editor; a program in a form suitable for loading into main storage for execution.

locate mode: A way of providing data by pointing to its location instead of moving it.

logic module: The logical IOCS routine that provides an interface between a processing program and physical IOCS.

logical record: A record that is defined in terms of the information it contains rather than by its physical traits.

*** loop:** A sequence of instructions that is executed repeatedly until a terminal condition prevails.

LSERV (label cylinder display): A program that formats a listing of the label cylinder located on SYSRES.

m

machine check analysis and recovery: 1. A feature that checks the severity of a CPU hardware failure and attempts to recover from the interrupt. Abbreviated MCAR. 2. In S/370 Mod 168 MCAR designates Maintenance Control Address Register.

machine check interrupt: The interrupt that occurs if the CPU fails to operate.

macro instruction: The macro instruction statement, the corresponding macro instruction definition, the resulting assembler language statements, and the machine language instructions and other data produced from the assembler language statements; loosely, any one of these representations of a machine language instruction sequence.

main page pool: In DOS/VS, the set of all page frames in real storage not assigned to the supervisor or one of the real partitions.

main storage: 1. The real address area of virtual storage. Contrast with auxiliary storage. 2. All program addressable storage from which instructions may be executed and from which data can be loaded directly into registers.

master scheduler: The part of the control program that responds to operator commands and returns required information.

MCAR Maintenance Control Address Register
(Mod 165 and 168)

MCDR Maintenance Control Data Register
(Mod 165 and 168)

MCER Maintenance Control Entry Register
(Mod 165 and 168)

microprogram: A set of basic or elementary machine instructions that is loaded into control storage to control CPU operations.

module (programming): A program unit that is input to, or output from, a single execution of an assembler, compiler, or linkage editor; a source, object, or load module.

move mode: A way of providing data by moving it instead of pointing to its location.

MRAR Maintenance Ripple Address Register
(Mod 165 and 168)

multijob operation: Concurrent execution of job steps from two or more jobs.

multiplexer channel: A channel designed to operate with a number of I/O devices simultaneously on a byte basis. That is, several I/O devices can be transferring records over the multiplexer channel, time-sharing it on a byte basis.

multiplexer mode: A means of transferring records to or from low-speed I/O devices on the multiplexer channel, by interleaving bytes of data. The multiplexer channel sustains simultaneous I/O operations on several subchannels. Bytes of data are interleaved and then routed to or from the selected I/O devices or to and from the desired locations in main storage. Multiplex mode is sometimes referred to as byte mode.

multiprogramming system: A system that controls more than one program simultaneously by interleaving their execution.

multitasking: The concurrent execution of one main task and one or more subtasks in the same position.

n

name: A set of one to eight characters that identifies a statement, data set, module, etc., and that is usually associated with the location of that which it identifies.

nucleus: That part of the control program that must always be present in main storage. Also, the main storage area used by the nucleus and other transient control program routines.

o

object module: The output of a single execution of an assembler or compiler, which constitutes input to linkage editor. An object module consists of one or more control sections in relocatable, though not executable, form and an associated control dictionary.

offline: 1. * Pertaining to equipment or devices not under control of the central processing unit. 2. Pertaining to program error diagnosis without using the computer system (offline program debugging).

*** online:** 1. Pertaining to equipment or devices under control of the central processing unit. 2. Pertaining to a user's ability to interact with a computer.

online test executive program (OLTEP): The control program of the online test system. OLTEP is the interface between the online test and the operating system.

on-line test system: A control program, OLTEP, and a series of tests (OLTs) designed to test I/O devices while permitting normal system processing in the foreground partitions.

operand: 1. * That which is operated upon. An operand is usually identified by an address part of an instruction. 2. Information entered with a command name to define the data on which the command processor operates and to control the execution of the command processor.

operator command: A statement to the control program, issued via a console device, which causes the control program to provide requested information, alter normal operations, initiate new operations, or terminate existing operations.

output queue: A queue of control information describing system output data sets, that specifies to an output writer the location and disposition of system output.

output writer: A part of the job scheduler that writes output data sets onto a system output unit, independently of the program that produced such data sets.

*** overflow:** 1. That portion of the result of an operation that exceeds the capacity of the intended unit of storage. 2. Pertaining to the generation of overflow as in (1).

p

page: 1. A fixed-length block of instructions, data or both, that can be transferred between real storage and external page storage. 2. To transfer instructions, data, or both, between real storage and external page storage.

page data set: An extent in auxiliary storage, in which pages are stored.

page fault: A program interruption that occurs when a page that is marked "not in real storage" is referred to by an active page. Synonymous with page translation exception.

page frame: A 2K block of real storage that can contain a page.

page frame table: A table that contains an entry for each frame. Each frame entry describes how the frame is being used.

page pool: The set of all page frames that may contain pages of programs in virtual mode.

page table (PGT): A table that indicates whether a page is in real storage and correlates virtual addresses with real storage addresses.

page translation exception: A program interruption that occurs when a virtual address cannot be translated by the hardware because the invalid bit in the page table entry for that address is set. See also segment translation exception, translation specification exception.

paging The process of transferring pages between real storage and the page data set.

parallel processing: Concurrent execution of one or more programs.

*** parameter:** A variable that is given a constant value for a specific purpose or process.

partition: 1. In OS/VS1, a division of the dynamic area of virtual storage, established at system generation. 2. In DOS/VS, a division of the virtual address area of virtual storage that is allocated for programs that may be paged.

Partitioned data set: A data set divided into several members. Each member has a unique name and is listed in a directory at the beginning of the data set. Members can be added or deleted as needed. Records within members are organized sequentially.

path: A series of segments that form the shortest distance in a region between a given segment and the root segment.

physical IOCS: Macro instructions and supervisor routines (Channel Scheduler) that schedule and supervise the execution of channel programs. Physical IOCS controls the actual transfer of records between the external storage medium and real storage.

physical record: A record that is defined in terms of physical qualities rather than by the information it contains.

polling: A technique by which each of the terminals sharing a communications line is periodically checked to determine if it requires servicing.

post: Note the occurrence of an event.

private library (of a job step): A partitioned data set other than the link library or the job library.

Private Second Level Directory (PSLD): The Private Second Level Directory is a table, located in the Supervisor and containing the highest phasenames found on the corresponding directory tracks of the Private Core Image Library.

privileged instruction: An instruction that can be executed only while the CPU is in the supervisor state. Protection I/O, direct control, and any instructions that manipulate the program status words are privileged.

problem determination aids (PDAID): Programs that trace a specified event when it occurs during the operation of a program. The traces provided are: QTAM Trace, I/O Trace, F/L Trace, and GSVC Trace.

problem program: Any program that is executed when the central processing unit is in the problem state; that is, any program that does not contain privileged instructions. This includes IBM-distributed programs, such as language translators and service programs, as well as programs written by a user.

processing program: 1. A general term for any program that is not a control program. 2. Synonymous with problem program.

processor: 1. * In hardware, a data processor. 2. * In software, a computer program that includes the compiling, assembling, translating, and related functions for a specific programming language. RPG II processor, FORTRAN processor. 3. Same as processing program.

program event recording: A System/370 feature that enables a program to be alerted to specific events. Abbeviated PER.

PSW (program status word): A double word in main storage used to control the order in which instructions are executed, and to hold and indicate the status of the system in relation to a particular program.

PTF: Program Temporary Fix

q

qualified name: A data set name that is composed of multiple names separated by periods (for example, TREE.FRUIT.APPLE).

qualifier: All names in a qualified name other than the rightmost, which is called the simple name.

queue: 1. A waiting line or list formed by items in a system waiting for service; for example, tasks to be performed or messages to be transmitted in message switching system. 2. To arrange in, or form, a queue.

queued access method: An access method that automatically governs the movement of data between the program using the access method and input/output devices. (The primary macro instructions used are GET and PUT.)

Quiesce Mode: A mode of operation that requires the foreground partition to be stopped by the operator. The operator does this on the console by issuing the PAUSE EOJ and STOP commands when requested by OLTEP.

QTAM Trace: A program that records certain supervisor and I/O activities on tape or in core-wrap mode.

r

reader: 1. A device that converts information in one form of storage to information in another form of storage. 2. A part of the scheduler that reads an input stream into the system.

ready condition: The condition of a task that is ready to be performed by the central processing unit.

real address: In VS, the address of a location in real storage.

real address area: The area of virtual storage where virtual addresses are equal to real addresses.

real mode: In DOS/VS, the mode of a program that may not be paged.

real storage: The storage of a System/370 computing system from which the central processing unit can directly obtain instructions and data, and to which it can directly return results. Synonymous with processor storage.

real partition: In DOS/VS, a division of the real address area of virtual storage that may be allocated for programs that are not to be paged, or programs that contain pages that are to be fixed.

record: A unit of data.

recovery management support: The facilities that gather information about hardware reliability and allow retry of operations that fail because of CPU, I/O device, or channel errors. Abbreviated to RMS.

reenterable: The attribute of a set of code that allows the same copy of the set of code to be used concurrently by two or more tasks.

reliability data extractor (RDE): A function that provides hardware reliability data that is analyzed by IBM.

relocatable library: A library of relocatable object modules and IOCS modules required by various compilers. It allows the user to keep frequently used modules available for combination with other modules without recompilation.

resource: Any facility of the computing system or operating system required by a job or task, and including main storage, input/output devices, the central processing unit, data files, and control and processing programs.

resource manager: Any control program routine responsible for the handling of a resource.

*** routine:** An ordered set of instructions that may have some general or frequent use.

S

scheduler: (See master scheduler and job scheduler.)

Second Level Directory (SLD): The table, located in the Supervisor and containing the highest phase-names found on the corresponding directory tracks of the system core image.

secondary storage: Auxiliary storage.

seek: Position the access mechanism of a direct-access device at a specified location.

segment: A continuous 64K area of virtual storage, which is allocated to a job or system task.

segment table (SGT): A table used in dynamic address translation to control user access to virtual storage segments. Each entry indicates the length, location, and availability of a corresponding page table.

segment translation exception: A program interruption that occurs when a virtual address cannot be translated by the hardware because the invalid bit in the segment table entry for that address is set. See also page translation exception, translation specification exception.

self-relocating: A programmed routine that is loaded at any doubleword boundary and can adjust its address values so as to be executed at that location.

self-relocating program: A program that is able to run in any area of storage by having an initialization routine to modify all address constants at object time.

selector channel: A channel designed to operate with only one I/O device at a time. Once the I/O device is selected, a complete record is transferred one byte at a time.

SEREP: A stand-alone environment recording, editing, and printing program that makes the data contained in an error logout area of real storage available for further analysis.

Shared Virtual Area (SVA): The last part of the virtual system address space that contains phases which are reenterable and relocatable and which can be shared between partitions.

simple name: The rightmost component of a qualified name (for example APPLE is the simple name in TREE.FRUIT.APPLE).

soft stop: A condition in which the CPU has stopped processing but continues to handle any requested interruptions.

source module: A series of statements which make up the entire input to a single execution of an assembler or compiler.

stacked job processing: A technique that permits multiple job definitions to be grouped (stacked) for presentation to the system, which automatically recognizes the jobs, one after the other.

stand-alone dump: A program that displays the contents of the registers and all of real storage and that runs independently.

storage block: An area of main storage consisting of 2048 bytes to which a storage key can be assigned.

*** storage protection:** An arrangement for preventing access to storage for either reading, or writing, or both.

subtask: A task in which control is initiated by a main task by means of a macro instruction that attaches it.

supervisor: The part of a control program that coordinates the use of resources and maintains the flow of CPU operations.

supervisor state: The state of CPU operation that allows execution of privileged instructions. When bit 15 of the PSW is zero, the CPU is in the supervisor state.

SVA: See Shared Virtual Area.

SVC (supervisor call): An instruction which causes an SVC interruption in the hardware to give control to a control program routine (called an SVC routine) for some specific action, such as reassigning parts of main storage or retrieving data from an I/O device.

synchronous: Occurring with a regular or predictable time relationship.

SYSIN: A system input stream.

SYSOUT: A system output stream.

system generation (SYSGEN): The process of tailoring the IBM-supplied operating system to user requirements.

system debugging aids: A set of routines provided to trace specific program events by using the program event recording facilities. Abbreviated SDAIDS.

System Directory List (SDL): A list of highly used phases (either only in the system CIL or also in the SVA). This list is placed in the SVA.

system input unit: A device specified as a source of an input stream.

system library: The collection of all cataloged data sets at an installation.

system macro instruction: A macro instruction that provides access to operating system facilities.

system output unit: An output device shared by all jobs.

system recorder file: The data file that is used to record hardware reliability data.

system residence volume: The volume on which the nucleus of the operating system and the highest level index of the catalog are located.

SYSCTLG: An optional system data set on the primary system residence device containing addresses relating installation data set names to specific volume numbers.

SYS1.LINKLIB: A system data set containing the system program modules that are not either permanently resident in main storage or resident in the SYS1.SVCLIB.

SYS1.LOGREC: A system data set on the primary system residence device containing information regarding system failures.

SYS1.NUCLEUS: A system data set on the primary system residence device containing the IPL program and the primary nucleus.

SYS1.PROCLIB: A data set containing cataloged procedures—handy sets of control statements that can be called into use by EXEC statements.

SYS1.SVCLIB: A system data set on the primary system residence device containing all of those SVC routines, I/O error recovery routines, and access method routines, that are not permanently resident in main storage.

SYS1.SYSJOBQE: A system data set used by the scheduler as a storage and work area for information about the input and output streams. Contains the input and output queues.

t

task: A unit of work for the central processing unit from the standpoint of the control program.

task queue: A queue of all the task control blocks present in the system at any one time.

task selection: The supervisor mechanism for determining which program should gain control of CPU processing.

telecommunications: Data transmission between a system and remotely located devices via a unit that performs format conversion and controls the rate of transmission.

teleprocessing: The processing of data that is received from or sent to remote locations by way of telecommunication lines.

terminal: 1. * A point in a system or communication network at which data can either enter or leave. 2. Any device capable of sending and receiving information over a communication channel.

Terminating partition: In DOS/VS this is a partition owning a program which is in the process of being terminated either because of a program cancel condition or because of EOJ.

test—run definition: Information requested by OLTEP at the various communications intervals. This information consists of the device to be tested, the test or test routines to be executed, and the options to be exercised.

test translator: A facility that allows various debugging procedures to be specified in assembler language programs.

text: The control sections of an object or load module.

throughput: The rate at which work can be handled by a system.

trace: 1. To record a series of events as they occur. 2. The record of a series of events.

* **tracing routine:** A routine that provides a historical record of specified events in the execution of a program.

track hold: A function for protecting DASD tracks that are currently being processed. When track hold is specified in the DTF, a track that is being modified by a task in one partition cannot be concurrently accessed by a task or subtask in another partition.

Transient area: An area in the supervisor used for temporary storage of transient routines, such as non-resident supervisor call or error-handling routines.

transient routines: These self-relocating routines are permanently stored on the system residence device and loaded (by the supervisor) into the transient area when needed for execution.

translation specification exception: A program interruption that occurs when a page table entry, segment table entry, or the control register pointing to the segment table contains information in an invalid format. See also page translation exception, segment translation exception.

transmittal mode: The way the contents of an input buffer are made available to the program, and the way a program makes records available for output.

turnaround time: The time between submission of a job to a computing center and the return of results.

U

U format: A data set format in which blocks are of unknown length.

unit name: Usually, the unit address of a particular device, specified at the time a system is installed. For example 191 or 293. (See device name.)

user program: See problem program.

unrecoverable error: See irrecoverable error.

utility program: A program designed to perform a routine task, such as transcribing data from one storage device to another.

V

V format: A data set format in which logical records are of varying length and include a length indicator; and in which V format logical records may be blocked, with each block containing a block length indicator.

virtual address: An address that refers to virtual storage and must, therefore, be translated into a real storage address when it is used.

virtual address area: In DOS/VS and OS/VS, the area of virtual storage whose addresses are greater than the highest address of the real address area.

virtual mode: In DOS/VS and OS/VS, the mode of a program which may be paged.

virtual storage: Addressable space that appears to the user as real storage, from which instructions and data are mapped into real storage locations. The size of virtual storage is limited by the addressing scheme of the computing system and by the amount of auxiliary storage available, rather than by the actual number of real storage locations.

virtual storage access method (VSAM): VSAM is an access method for direct or sequential processing of fixed and variable length records on direct access devices. The records in a VSAM file can be organized either in logical sequence by a key field (key sequence) or in the physical sequence in which they are written on the file (entry-sequence). A key-sequenced file has an index, an entry-sequenced file does not.

volume: 1. That portion of a single unit of storage media which is accessible to a single read/write mechanism, for example, a drum, a disk pack, or part of a disk storage module. 2. A recording medium that is mounted and dismounted as a unit, for example, a reel of magnetic tape, a disk pack, a data cell.

volume table of contents (VTOC): A table associated with a direct-access volume, which describes each data set on the volume.

VSAM access method services: A multifunction utility program that defines VSAM files and allocates space for them, converts indexed sequential files to key-sequenced files with indexes, facilitates data portability between operating systems, creates backup copies of files and indexes, helps make inaccessible files accessible, and lists file and catalog entries.

W

wait condition: The condition of a task that needs one or more events to occur before the task can be ready to be performed by the central processing unit.

wait state: The state of the system when no instructions are being processed, but the system is not fully stopped. The system can accept I/O and external interruptions, and can be put through the IPL procedure.

wraparound: 1. The continuation of an operation from the maximum addressable location in storage to the first addressable location. 2. The continuation of register addresses from the highest register address to the lowest. 3. On a CRT display device, the continuation of an operation, e.g., a read or cursor movement, from the last character position in the display buffer to the first position in the display buffer.

Section 8 Contents

BIBLIOGRAPHY: List 1

Publications referenced in this Guide, arranged in numerical order.

This list only contains publications cited in this guide.

GA21–9124–3 (GN21–0166) IBM 3505 Card Reader and 3525 Card Punch Subsystem Component Description

GA22–6846 IBM S/360 2702 Transmission Control

GA22–6954 IBM S/360 and S/370 Mod 195 Operating Procedures

GA22–6966 IBM S/370 Mod 155 Operating Procedures

GA22–6969 IBM S/370 Mod 165 Operating Procedures

GA22–7000 IBM S/370 Principles of Operation

GA22–7017 IBM S/370 155 II DAT

GA24–3543–3 IBM 3211 Printer, 3216 Interchangeable Train Cartridge, and 3811 Printer Control Unit Component Description and Operator's Guide

GA26–1619 IBM 3340 Reference Manual

GA27–2742–2 Operator's Guide for IBM 3270 Information Display Systems

GA27–3051 Introduction to 3705 Communications Controller, Principles of Operation

GA32–0020–2 IBM 3803 3420 Magnetic Tape Subsystems Component Description

GA32–0021 IBM 3803 3420 Magnetic Tape Subsystems, Subsystem Description

GA32–0022 IBM 3410/3411 Magnetic Tape Subsystems Component Description

GA33–1509 IBM S/370 Mod 125 Procedures

GA33–1510 IBM S/370 Mod 115 Functional Characteristics

GA33–3010 IBM S/370 Mod 135 Channel Characteristics

GC20–1699 Data Processing Glossary

GC20–1806–1 IBM Virtual Machine Facility/370 Operator's Guide, Release 2

GC24–5091–3 OS/VS1 Programmer's Reference Digest VS1 Release 3

GC26–3784 OS/VS Checkpoint/Restart

GC27–6993 HASP II Version 4 Operator's Guide

GC28–0638–1 OS/VS SYS1.LOGREC Error Recording, VS1 Release 2 and VS2 Release 1

GC28–0665–0 OS/VS1 Service Aids
VS1 Release 3

GC28–0666–1 OS/VS1 OLTEP
VS1 Release 3

GC33–5378–1 DOS/VS Operating Procedures, Release 29

GC33–5380–1 DOS/VS Serviceability Aids and Debugging Procedures, Release 29

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GC38–0005 IBM S/370 Mod 135 Procedures

GC38–0015 IBM S/370 Mod 145 Operating Procedures

GC38–0025 IBM S/370 Mod 158 Operating Procedures

GC38–0030 IBM S/370 Mod 168 Operating Procedures

GC38–0110–3 Operator's Library: OS/VS1 Reference VS1 Release 3

GC38–0210–0 Operator's Library: OS/VS2 Reference VS2 Release 1

GC38–0210–1 Operator's Library: OS/VS2 Reference VS2 Release 2

GC38–0255–1 OS/VS1 Display Consoles
VS1 Release 2

GC38–0260 OS/VS2 Display Consoles
VS2 Release 1

GC38–1001–2 VS1 System Messages
VS1 Release 3

GC38–1002–1 VS2 System Messages
VS2 Release 1.6

SR20–1078–4 IBM S/360 Operator's Reference Guide

GX20–1850 S/370 Reference Summary

GX20–1926 IBM Virtual MACHINE Facility/370
Quick Guide for Users

GX38–0227 OS/VS2 (JES2) Command Language Reference Summary

GY32–5034 Tape Unit Cleaning Procedure (3420 tape)

SY33–8571 DOS/VS Handbook, Release 29

G232–0004 IBM 3410/3411 Operator's Guide

S232–0003–2 IBM 3420 Operator's Guide

BIBLIOGRAPHY: List 2

This list is arranged by subject matter and includes some publications not quoted from nor referenced in this guide that are added because they are pertinent and useful for background.

General Information

GA22–6822–20 IBM S/360 and S/370 Bibliography
GC20–1699 Data Processing Glossary

General System Information

GA22–7001 IBM S/370 System Summary
GA22–7000 IBM S/370 Principles of Operation
GX20–1850–2 S/370 Reference Summary Card
SR20-1078–4 IBM S/360 Operator's Reference Guide

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GA33–1510 IBM S/370 Mod 115 Functional Characteristics
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GA38–0030 IBM S/370 Mod 165 Operating Procedures
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GA22–7010 IBM S/370 Mod 168 Functional Characteristics
GA22–6954 IBM S/360 and S/370 Mod 195 Operating Procedures
GA22–6943 IBM S/360 and S/370 Mod 195 Functional Characteristics

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GA22–6895 IBM S/360 Component Description 2820 Storage Control and 2301 Drum Storage
GA26–5988 IBM S/360 Component Description, 2841 and associated DASD, 2311 Disk Storage Drive, 2321 Data Cell Drive, 2303 Drum Storage
GA26–1589 Component Summary, 2835 Storage Control, 2305 Fixed Head Storage
GA26–3599 IBM S/360 Component Descriptions, 2314 Direct Access Storage Facility and 2844 Auxiliary Storage Control
GA26–1606 IBM 2319 Disk Storage Component Description
GA26–1592 Reference Manual for IBM 3830 Storage Control and IBM 3330 Disk Storage
GA26–1619 IBM 3340 Component Summary

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GA26–4187 Diskette Handling Procedures

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G232–0004 IBM 3410/3411 Operator's Guide
GA32–0022 IBM 3410/3411 Magnetic Tape Subsystems Component Description
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GA32–0020–2 IBM 3803/3420 Magnetic Tape Subsystems Component Description
GA32–0021 IBM 3803/3420 Magnetic Tape Subsystems, Subsystem Description
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SY32–5033 Tape Unit Cleaning Procedures (2420, 3420)
GA22–6866 IBM S/360 Component Descriptions: 2400 Series, 2803/2804 Tape Controls, and 2816 Switching Unit

Printers

GA24–3552 IBM 3210 Console Printer Keyboards
GA24–3543–3 IBM 3211 Printer, 3216 Interchangeable Train Cartridge, and 3811 Printer Control Unit Component Description and Operator's Guide
GA24–3073 IBM 1403 Printer Component Description

Card Readers and/or Punches

GA26–5893	IBM 2560 Multifunction Card Machine Component Description
GA21–9124–3	IBM 3504 Card Reader, IBM 3505 Card Reader and
(GN21–0166)	IBM 3525 Card Punch Subsystem Component Description
GA21–9167	IBM S/370 5425 Multifunction Card Unit Programmer's Reference Manual and Operator's Guide

Display Equipment

GA27–2739	An Introduction to the IBM 3270 Information Display System
GA27–2742–2	IBM 3270 Information Display Systems Operator's Guide
SY27–2330	IBM 3277 Display Station Troubleshooting Guide
GA27–2701	IBM S/360 2250 Display Unit Component Description
GA27–2700	IBM S/370 2260 Display Station Component Description

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SH20–1232	IBM 2740 Communication Terminal
GC28–2017	IBM 2741 Communication Terminal
GA27–3070	IBM 3735 Programmable Buffered Terminal

Transmission Control Devices

GA22–6864	IBM 2701 Data Adapter Unit Operation
GA22–6846	IBM S/360 2702 Transmission Control
GA27–3051	Introduction to 3705 Communications Controller Principles of Operation

Data Entry Systems

GA21–9152–1	IBM 3740 Data Entry System
GA21–9131	IBM 3741 Data Station Operator's Guide

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Operating Systems

GR20–4260–1	Introduction to Virtual Storage in S/370
GC38–0335	Operator's Library OS/VS1 CRJE
GC38–0120–3	Operator's Library: OS/VS Console Configurations
GC38–0255–1	OS/VS1 Display Consoles
(GN27–1432)	for VS1 Release 2
GC28–0665	OS/VS1 Service Aids for VS1 Release 3
GC38–0110–3	Operator's Library OS/VS1 Reference VS1 Release 3
GC30–2037	Operator's Library: OS/VS TCAM
GC38–1007–3	OS/VS Message Library: Linkage Editor and Loader Messages
GC38–1004–3	OS/VS Message Library: Routing and Descriptor Codes
GC38–1006–3	OS/VS Message Library: Service Aids and OLTEP Messages
GC38–1003–3	OS/VS Message Library: VS System Codes, Release 3
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GC38–1005–3	OS/VS Message Library: Utilities Messages, Release 3
GC38–1010–1	OS/VS Message Library: VS1 RES RTAM and Account Messages
GC26–3791–3	OS/VS1 System Generation Reference, Release 3
GC24–5093–2	OS/VS1 Debugging Guide, VS1 Release 3
GC28–0666–1	OS/VS1 OLTEP, VS1 Release 3
GC26–3784–3	OS/VS Checkpoint/Restart, VS1 Release 3 and VS2 Release 2
GC28–0668	OS/VS1 SYS1.LOGREC Error Recording, VS1 Release 3
GC24–5091–3	OS/VS1 Programmer's Reference Digest, VS1 Release 3
GC35–0005–2	OS/VS Utilities, VS1 Release 3 and VS2 Release 2
* GC38–0210	Operator's Library: OS/VS2 Reference, Release 1
* GC38–0260	OS/VS2 Display Consoles, VS2 Release 1
* GC38–1002–1	VS2 System Messages, VS2 Release 1.6
* GC28–0638	OS/VS SYS1.LOGREC Error Recording, VS1 Release 2 and VS2 Release 1
GC35–0005–2	OS/VS Utilities, VS2 Release 2
GX38–0227	OS/VS2 (JES2) Command Language Reference Summary
GC38–0210–1	Operator's Library OS/VS2 Reference, VS2 Release 2
GC27–6993	HASP II Version 4 Operator's Guide

* As of March 1974 and until a succeeding Release to VS2 Release 1.6 is issued, order these publications by substituting T for C. For example, GT38–0210 rather than GC38–0210. If not, you will get publications for VS2 Release 2, the MVM system.

DOS

GC33–5370	Introduction to DOS/VS
GC33–5378–1	DOS/VS Operating Procedures, Release 29
GC33–5380–1	DOS/VS Serviceability Aids and Debugging Procedures, Release 29
GC33–5381–1	DOS/VS System Utilities, Release 29
GC33–5383	DOS/VS OLTEP Reference
SY33–8571	DOS/VS Handbook, Release 29

VM

GC20–1806–1	IBM Virtual Machine Facility/370 Operator's Guide, Release 2
GX20–1926	IBM Virtual Machine Facility/370 Quick Guide for Users

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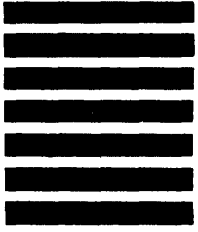

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