CE Handbook

IBM

IBM Field Engineering Handbook

System/360 Operating System

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This is a major revision of, and obsoletes, 229-3169-1. The manual has been entirely rewritten to reflect numerous additions and changes, and should be reviewed in its entirety. Changes are continually made to the specifications herein; any such changes will be reported in subsequent revisions or FE Supplements.

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STANDARD INSTRUCTION SET

NAME	MNEMONIC	TYPE	CODE	OPERAND
Add	AR	RR	1A	R1, R2
Add	A	RX	5A	R1, D2 (X2, B2)
Add Halfword	AH	RX	4A	R1, D2 (X2, B2)
Add Logical	ALR	RR	1E	R1, R2
Add Logical	AL	RX	5E	R1, D2 (X2, B2)
AND	NR	RR	14	R1, R2
AND	N	RX	54	R1, D2 (X2, B2)
AND	NI	SI	94	D1 (B1), I2
AND	NC	SS	D4	D1 (L, B1), D2 (B2)
Branch and Link	BALR	RR	05	R1, R2
Branch and Link	BAL	RX	45	R1, D2 (X2, B2)
Branch on Condition	BCR	RR	07	M1, R2
Branch on Condition	BC	RX	47	M1, D2 (X2, B2)
Branch on Count	BCTR	RR	06	R1, R2
Branch on Count	BCT	RX	46	R1, D2 (X2, B2)
Branch on Index High	BXH	RS	86	R1, R3, D2 (B2)
Branch on Index Low or Equal	BXLE	RS	87	R1, R3, D2 (B2)
Compare	CR	RR	19	R1, R2
Compare	C	RX	59	R1, D2 (X2, B2)
Compare Halfword	CH	RX	49	R1, D2 (X2, B2)
Compare Logical	CLR	RR	15	R1, R2
Compare Logical	CL	RX	55	R1, D2 (X2, B2)
Compare Logical	CLC	SS	D5	D1 (L, B1), D2 (B2)
Compare Logical	CLI	SI	95	D1 (B1), I2
Convert to Binary	CVB	RX	4F	R1, D2 (X2, B2)
Convert to Decimal	CVD	RX	4E	R1, D2 (X2, B2)
Diagnose		SI	83	
Divide	DR	RR	1D	R1, R2
Divide	D	RX	5D	R1, D2 (X2, B2)
Exclusive OR	XR	RR	17	R1, R2
Exclusive OR	X	RX	57	R1, D2 (X2, B2)
Exclusive OR	XI	SI	97	D1 (B1), I2
Exclusive OR	XC	SS	D7	D1 (L, B1), D2 (B2)
Execute	EX	RX	44	R1, D2 (X2, B2)
Halt I/O	HIO	SI	9E	D1 (B1)
Insert Character	IC	RX	43	R1, D2 (X2, B2)
Load	LR	RR	18	R1, R2
Load	L	RX	58	R1, D2 (X2, B2)
Load Address	LA	RX	41	R1, D2 (X2, B2)
Load and Test	LTR	RR	12	R1, R2
Load Complement	LCR	RR	13	R1, R2
Load Halfword	LH	RX	48	R1, D2 (X2, B2)
Load Multiple	LM	RS	98	R1, R3, D2 (B2)
Load Negative	LNR	RR	11	R1, R2
Load Positive	LPR	RR	10	R1, R2
Load PSW	LPSW	SI	82	D1 (B1)
Move	MVI	SI	92	D1 (B1), I2
Move	MVC	SS	D2	D1 (L, B1), D2 (B2)
Move Numerics	MVN	SS	D1	D1 (L, B1), D2 (B2)
Move with Offset	MVO	SS	F1	D1 (L1, B1), D2 (L2, B2)
Move Zones	MVZ	SS	D3	D1 (L, B1), D2 (B2)
Multiply	MR	RR	1C	R1, R2
Multiply	M	RX	5C	R1, D2 (X2, B2)
Multiply Halfword	MH	RX	4C	R1, D2 (X2, B2)
OR	OR	RR	16	R1, R2
OR	O	RX	56	R1, D2 (X2, B2)
OR	OI	SI	96	D1 (B1), I2
OR	OC	SS	D6	D1 (L, B1), D2 (B2)
Pack	PACK	SS	F2	D1 (L1, B1), D2 (L2, B2)
Set Program Mask	SPM	RR	04	R1
Set System Mask	SSM	SI	80	D1 (B1)
Shift Left Double	SLDA	RS	8F	R1, D2 (B2)
Shift Left Single	SLA	RS	8B	R1, D2 (B2)
Shift Left Double Logical	SLDL	RS	8D	R1, D2 (B2)
Shift Left Single Logical	SLL	RS	89	R1, D2 (B2)
Shift Right Double	SRDA	RS	8E	R1, D2 (B2)

STANDARD INSTRUCTION SET (Continued)

Shift Right Single	SRA	RS	8A	R1, D2 (B2)
Shift Right Double Logical	SRDL	RS	8C	R1, D2 (B2)
Shift Right Single Logical	SRL	RS	88	R1, D2 (B2)
Start I/O	SIO	SI	9C	D1 (B1)
Store	ST	RX	50	R1, D2 (X2, B2)
Store Character	STC	RX	42	R1, D2 (X2, B2)
Store Halfword	STH	RX	40	R1, D2 (X2, B2)
Store Multiple	STM	RS	90	R1, R3, D2 (B2)
Subtract	SR	RR	1B	R1, R2
Subtract	S	RX	5B	R1, D2 (X2, B2)
Subtract Halfword	SH	RX	4B	R1, D2 (X2, B2)
Subtract Logical	SLR	RR	1F	R1, R2
Subtract Logical	SL	RX	5F	R1, D2 (X2, B2)
Supervisor Call	SVC	RR	0A	I
Test and Set	TS	SI	93	D1 (B1)
Test Channel	TCH	SI	9F	D1 (B1)
Test I/O	TIO	SI	9D	D1 (B1)
Test Under Mask	TM	SI	91	D1 (B1), I2
Translate	TR	SS	DC	D1 (L, B1), D2 (B2)
Translate and Test	TRT	SS	DD	D1 (L, B1), D2 (B2)
Unpack	UNPK	SS	F3	D1 (L1, B1), D2 (L2, B2)

DECIMAL FEATURE INSTRUCTIONS

Add Decimal	AP	SS	FA	D1 (L1, B1), D2 (L2, B2)
Compare Decimal	CP	SS	F9	D1 (L1, B1), D2 (L2, B2)
Divide Decimal	DP	SS	FD	D1 (L1, B1), D2 (L2, B2)
Edit	ED	SS	DE	D1 (L, B1), D2 (B2)
Edit and Mark	EDMK	SS	DF	D1 (L, B1), D2 (B2)
Multiply Decimal	MP	SS	FC	D1 (L1, B1), D2 (L2, B2)
Subtract Decimal	SP	SS	FB	D1 (L1, B1), D2 (L2, B2)
Zero and Add	ZAP	SS	F8	D1 (L1, B1), D2 (L2, B2)

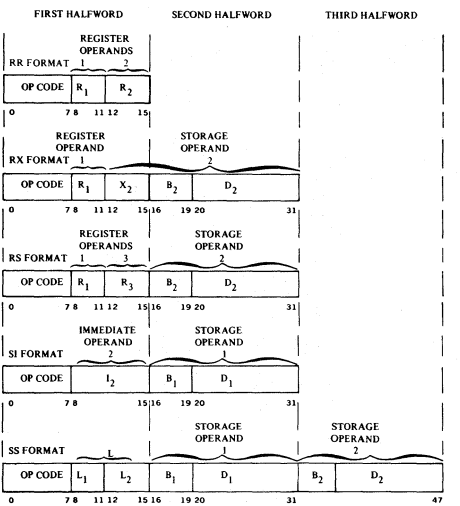
DIRECT CONTROL FEATURE INSTRUCTIONS

Read Direct	RDD	SI	85	D1 (B1), I2
Write Direct	WRD	SI	84	D1 (B1), I2

PROTECTION FEATURE INSTRUCTIONS

Insert Storage Key	ISK	RR	09	R1, R2
Set Storage Key	SSK	RR	08	R1, R2

BASIC INSTRUCTION FORMATS



FLOATING-POINT FEATURE INSTRUCTIONS

Add Normalized (Long)	ADR	RR	2A	R1, R2
Add Normalized (Long)	AD	RX	6A	R1, D2 (X2, B2)
Add Normalized (Short)	AER	RR	3A	R1, R2
Add Normalized (Short)	AE	RX	7A	R1, D2 (X2, B2)
Add Unnormalized (Long)	AWR	RR	2E	R1, R2
Add Unnormalized (Long)	AW	RX	6E	R1, D2 (X2, B2)
Add Unnormalized (Short)	AUR	RR	3E	R1, R2
Add Unnormalized (Short)	AU	RX	7E	R1, D2 (X2, B2)
Add Normalized (Extended)	* AXR	RR	36	R1, R2
Compare (Long)	CDR	RR	29	R1, R2
Compare (Long)	CD	RX	69	R1, D2 (X2, B2)
Compare (Short)	CER	RR	39	R1, R2
Compare (Short)	CE	RX	79	R1, D2 (X2, B2)
Divide (Long)	DDR	RR	2D	R1, R2
Divide (Long)	DD	RX	6D	R1, D2 (X2, B2)
Divide (Short)	DER	RR	3D	R1, R2
Divide (Short)	DE	RX	7D	R1, D2 (X2, B2)
Halve (Long)	HDR	RR	24	R1, R2
Halve (Short)	HER	RR	34	R1, R2
Load and Test (Long)	LTDR	RR	22	R1, R2
Load and Test (Short)	LTER	RR	32	R1, R2
Load Complement (Long)	LCDR	RR	23	R1, R2
Load Complement (Short)	LCER	RR	33	R1, R2
Load (Long)	LDR	RR	28	R1, R2
Load (Long)	LD	RX	68	R1, D2 (X2, B2)
Load Negative (Long)	LNDR	RR	21	R1, R2
Load Negative (Short)	LNER	RR	31	R1, R2
Load Positive (Long)	LPDR	RR	20	R1, R2
Load Positive (Short)	LPER	RR	30	R1, R2
Load (Short)	LER	RR	38	R1, R2
Load (Short)	LE	RX	78	R1, D2 (X2, B2)
Load Rounded (Extended to Long)	* LRDR	RR	25	R1, R2
Load Rounded (Long to Short)	* LRER	RR	35	R1, R2
Multiply (Long)	MDR	RR	2C	R1, R2
Multiply (Long)	MD	RX	6C	R1, D2 (X2, B2)
Multiply (Short)	MER	RR	3C	R1, R2
Multiply (Short)	ME	RX	7C	R1, D2 (X2, B2)
Multiply (Extended)	* MXR	RR	26	R1, R2
Multiply (Long/Extended)	* MXDR	RR	27	R1, R2
Multiply (Long/Extended)	* MXD	RX	67	R1, D2 (X2, B2)
Store (Long)	STD	RX	60	R1, D2 (X2, B2)
Store (Short)	STE	RX	70	R1, D2 (X2, B2)
Subtract Normalized (Long)	SDR	RR	2B	R1, R2
Subtract Normalized (Long)	SD	RX	6B	R1, D2 (X2, B2)
Subtract Normalized (Short)	SER	RR	3B	R1, R2
Subtract Normalized (Short)	SE	RX	7B	R1, D2 (X2, B2)
Subtract Unnormalized (Long)	SWR	RR	2F	R1, R2
Subtract Unnormalized (Long)	SW	RX	6F	R1, D2 (X2, B2)
Subtract Unnormalized (Short)	SUR	RR	3F	R1, R2
Subtract Unnormalized (Short)	SU	RX	7F	R1, D2 (X2, B2)
Subtract Normalized (Extended)	* SXR	RR	37	R1, R2

*** extended floating point instructions, special feature.**

CHARACTERISTICS FOR CONSTANTS

Code	Type	Machine Format
C	Character	8-Bit Code for each Character
X	Hexadecimal	4-Bit Code for each Hexadecimal Digit
B	Binary	Binary Digits (ones and zeros)
F	Fixed-point	Signed, Fixed-point Binary Format; Normally a Fullword
H	Fixed-point	Signed, Fixed-point Binary Format; Normally a Halfword
E	Floating-point	Short Floating-point Format; Normally a Fullword
D	Floating-point	Long Floating-point Format; Normally a Doubleword
P	Decimal	Packed Decimal Format
Z	Decimal	Zoned Decimal Format
A	Address	Value of Address; Normally a Fullword
V	Address	Space Reserved for External Symbol Addresses; Each Address Normally a Fullword
S	Address	Address in Base Displacement Form
Y	Address	Value of Address; Normally a Halfword

EXTENDED MNEMONIC INSTRUCTION CODES

GENERAL

Extended Code		Machine Instruction		Meaning
B	D2(X2,B2)	BC	15, D2(X2,B2)	Branch Unconditionally
BR	R2	BCR	15, R2	Branch Unconditionally
NOP	D2(X2,B2)	BC	0, D2(X2,B2)	No Operation
NOPR	R2	BCR	0, R2	No Operation (RR)

AFTER COMPARE INSTRUCTIONS (A:B)

BH	D2(X2,B2)	BC	2, D2(X2,B2)	Branch on A High
BL	D2(X2,B2)	BC	4, D2(X2,B2)	Branch on A Low
BE	D2(X2,B2)	BC	8, D2(X2,B2)	Branch on A Equal B
BNH	D2(X2,B2)	BC	13, D2(X2,B2)	Branch on A Not High
BNL	D2(X2,B2)	BC	11, D2(X2,B2)	Branch on A Not Low
BNE	D2(X2,B2)	BC	7, D2(X2,B2)	Branch on A Not Equal B

AFTER ARITHMETIC INSTRUCTIONS

BO	D2(X2,B2)	BC	1, D2(X2,B2)	Branch on Overflow
BP	D2(X2,B2)	BC	2, D2(X2,B2)	Branch on Plus
BM	D2(X2,B2)	BC	4, D2(X2,B2)	Branch on Minus
BZ	D2(X2,B2)	BC	8, D2(X2,B2)	Branch on Zero
BNP	D2(X2,B2)	BC	13, D2(X2,B2)	Branch on Not Plus
BNM	D2(X2,B2)	BC	11, D2(X2,B2)	Branch on Not Minus
BNZ	D2(X2,B2)	BC	7, D2(X2,B2)	Branch on Not Zero

AFTER TEST UNDER MASK INSTRUCTIONS

BO	D2(X2,B2)	BC	1, D2(X2,B2)	Branch if Ones
BM	D2(X2,B2)	BC	4, D2(X2,B2)	Branch if Mixed
BZ	D2(X2,B2)	BC	8, D2(X2,B2)	Branch if Zeros
BNO	D2(X2,B2)	BC	14, D2(X2,B2)	Branch if Not Ones

CNOP ALIGNMENT

Doubleword							
Word				Word			
Halfword		Halfword		Halfword		Halfword	
Byte	Byte	Byte	Byte	Byte	Byte	Byte	Byte
0,4		2,4		0,4		2,4	
0,8		2,8		4,8		6,8	

EDIT AND EDIT & MARK SYMBOLS

Mask	Meaning	Mask	Meaning
hex 40	blank	hex 22	field separator character
hex 21	significance start character	hex 20	digit-select character

PERMANENT STORAGE ASSIGNMENT

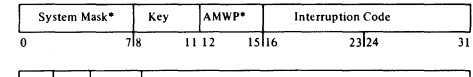
DEC	ADDRESS HEX	BINARY	LENGTH	PURPOSE
0	0	0000 0000	doubleword	Initial program loading PSW
8	8	0000 1000	doubleword	Initial program loading CCW1
16	10	0001 0000	doubleword	Initial program loading CCW2
24	18	0001 1000	doubleword	External old PSW
32	20	0010 0000	doubleword	Supervisor call old PSW
40	28	0010 1000	doubleword	Program old PSW
48	30	0011 0000	doubleword	Machine-check old PSW
56	38	0011 1000	doubleword	Input/output old PSW
64	40	0100 0000	doubleword	Channel status word
72	48	0100 1000	word	Channel address word
76	4C	0100 1100	word	Unused
80	50	0101 0000	word	Timer (uses bytes 50, 51 & 52)
84	54	0101 0100	word	Unused
88	58	0101 1000	doubleword	External new PSW
96	60	0110 0000	doubleword	Supervisor call new PSW
104	68	0110 1000	doubleword	Program new PSW
112	70	0111 0000	doubleword	Machine-check new PSW
120	78	0111 1000	doubleword	Input/output new PSW
128	80	1000 0000	(1)	Diagnostic scan-out area

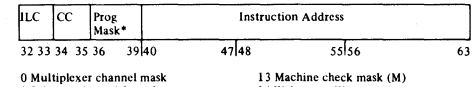
(1) The size of the diagnostic scan-out area depends on the particular model and I/O channels; for models 30 through 75, maximum size is 256 bytes.

CONDITION CODES

Condition Code Setting	0	1	2	3
Mask Bit Position	8	4	2	1
FLOATING-POINT ARITHMETIC				
Add Normalized S/L	zero	<zero	>zero	– –
Add Unnormalized S/L	zero	<zero	>zero	– –
Compare S/L (A:B)	equal	A low	A high	– –
Load and Test S/L	zero	<zero	>zero	– –
Load Complement S/L	zero	<zero	>zero	– –
Load Negative S/L	zero	<zero	– –	– –
Load Positive S/L	zero	– –	>zero	– –
Subtract Normalized S/L	zero	<zero	>zero	– –
Subtract Unnormalized S/L	zero	<zero	>zero	– –
FIXED-POINT ARITHMETIC				
Add H/F	zero	<zero	>zero	overflow
Add Logical	zero, no carry	not zero, no carry	zero, carry	not zero, carry
Compare H/F (A:B)	equal	A low	A high	– –
Load and Test	zero	<zero	>zero	– –
Load Complement	zero	<zero	>zero	overflow
Load Negative	zero	<zero	– –	– –
Load Positive	zero	– –	>zero	overflow
Shift Left Double	zero	<zero	>zero	overflow
Shift Left Single	zero	<zero	>zero	overflow
Shift Right Double	zero	<zero	>zero	– –
Shift Right Single	zero	<zero	>zero	– –
Subtract H/F	zero	<zero	>zero	overflow
Subtract Logical	– –	not zero, no carry	zero, carry	not zero, carry
DECIMAL ARITHMETIC				
Add Decimal	zero	<zero	>zero	overflow
Compare Decimal (A:B)	equal	A low	A high	– –
Subtract Decimal	zero	<zero	>zero	overflow
Zero and Add	zero	<zero	>zero	overflow
LOGICAL OPERATIONS				
AND	zero	not zero	– –	– –
Compare Logical (A:B)	equal	A low	A high	– –
Edit	zero	<zero	>zero	– –
Edit and Mark	zero	<zero	>zero	– –
Exclusive OR	zero	not zero	– –	– –
OR	zero	not zero	– –	– –
Test Under Mask	zero	mixed	– –	one
Translate and Test	zero	incomplete	complete	– –
STATUS SWITCHING				
Test and Set	zero	one	– –	– –
INPUT/OUTPUT OPERATIONS				
Halt I/O	interruption pending	CSW stored	burst op stopped	not oper
Start I/O	successful	CSW stored	busy	not oper
Test I/O	available	CSW stored	busy	not oper
Test Channel	available	interruption pending	burst mode	not oper

PROGRAM STATUS WORD





0 Multiplexer channel mask
1 Selector channel 1 mask
2 Selector channel 2 mask
3 Selector channel 3 mask
4 Selector channel 4 mask
5 Selector channel 5 mask
6 Selector channel 6 mask
7 External mask
12 USACII mode (A)
13 Machine check mask (M)
14 Wait state (W)
15 Problem state (P)
32-33 Instruction Length code (ILC)
34-35 Condition code (CC)
36 Fixed-point overflow mask
37 Decimal overflow mask
38 Exponent underflow mask
39 Significance mask

* A one-bit equals on, and permits an interrupt.

CODE FOR PROGRAM INTERRUPTION

Interruption Code			Program Interrupt Cause	Interruption Code			Program Interrupt Cause
Dec	Hex	Binary		Dec	Hex	Binary	
1	1	0000 0001	Operation	9	9	0000 1001	Fixed-pt divide
2	2	0000 0010	Privileged op	10	A	0000 1010	Dec overflow
3	3	0000 0011	Execute	11	B	0000 1011	Decimal divide
4	4	0000 0100	Protection	12	C	0000 1100	Exp overflow
5	5	0000 0101	Addressing	13	D	0000 1101	Exp underflow
6	6	0000 0110	Specification	14	E	0000 1110	Significance
7	7	0000 0111	Data	15	F	0000 1111	Float-pt divide
8	8	0000 1000	Fixed-pt overflow				

HEXADECIMAL AND DECIMAL CONVERSION

To find the decimal number, locate the hex number and its decimal equivalent for each position. Add these to obtain the decimal number. To find the hex number, locate the next lower decimal number and its hex equivalent. Each difference is used to obtain the next hex number until the entire number is developed.

BYTE				BYTE				BYTE			
0123		4567		0123		4567		0123		4567	
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
6		5		4		3		2		1	

POWERS OF 16		POWERS OF 2	
16^n	n	2^n	n
1	0	512	9
16	1	1 024	10
256	2	2 048	11
4 096	3	4 096	12
65 536	4	8 192	13
1 048 576	5	16 384	14
16 777 216	6	32 768	15
268 435 456	7	65 536	16
4 294 967 296	8	131 072	17
68 719 476 736	9	262 144	18
1 099 511 627 776	10	524 288	19
17 592 186 044 416	11	1 048 576	20
281 474 976 710 656	12	2 097 152	21
4 503 599 627 370 496	13	4 194 304	22
72 057 594 037 927 936	14	8 388 608	23
1 152 921 504 606 846 976	15	16 777 216	24

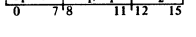
RR FORMAT INSTRUCTIONS

Decimal	Hexadecimal	Mnemonic	Graphic & Control Symbols BCDIC	Graphic & Control Symbols EBCDIC	(2) 7-Track Tape BCDIC	Punched Card Code	System/360 8-Bit Code
0	00			NUL		12-0-1-8-9	0000 0000
1	01			SOH		12-1-9	0000 0001
2	02			STX		12-2-9	0000 0010
3	03			ETX		12-3-9	0000 0011
4	04	SPM		PF		12-4-9	0000 0100
5	05	BALR		HT		12-5-9	0000 0101
6	06	BCTR		LC		12-6-9	0000 0110
7	07	BCR		DEL		12-7-9	0000 0111
8	08	SSK				12-8-9	0000 1000
9	09	ISK				12-1-8-9	0000 1001
10	0A	SVC		SMM		12-2-8-9	0000 1010
11	0B			VT		12-3-8-9	0000 1011
12	0C	(EBCDIC +)		FF		12-4-8-9	0000 1100
13	0D	(EBCDIC -)		CR		12-5-8-9	0000 1101
14	0E			SO		12-6-8-9	0000 1110
15	0F			SI		12-7-8-9	0000 1111
16	10	LPR		DLE		12-11-1-8-9	0001 0000
17	11	LNR		DC1		11-1-9	0001 0001
18	12	LTR		DC2		11-2-9	0001 0010
19	13	LCR		TM		11-3-9	0001 0011
20	14	NR		RES		11-4-9	0001 0100
21	15	CLR		NL		11-5-9	0001 0101
22	16	OR		BS		11-6-9	0001 0110
23	17	XR		IL		11-7-9	0001 0111
24	18	LR		CAN		11-8-9	0001 1000
25	19	CR		EM		11-1-8-9	0001 1001
26	1A	AR		CC		11-2-8-9	0001 1010
27	1B	SR		CU1		11-3-8-9	0001 1011
28	1C	MR		IFS		11-4-8-9	0001 1100
29	1D	DR		IGS		11-5-8-9	0001 1101
30	1E	ALR		IRS		11-6-8-9	0001 1110
31	1F	SLR		IUS		11-7-8-9	0001 1111
32	20	LPDR		DS		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				12-11-0-1-8-9	0011 0000
49	31	LNER				1-9	0011 0001
50	32	LTER		SYN		2-9	0011 0010
51	33	LCER				3-9	0011 0011
52	34	HER		PN		4-9	0011 0100
53	35	LRER		RS		5-9	0011 0101
54	36	AXR		UC		6-9	0011 0110
55	37	SXR		EOT		7-9	0011 0111
56	38	LER				8-9	0011 1000
57	39	CER				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

(2) Add C (check bit) for odd or even parity as needed, except for even parity, decimal 64 is CA, the same as decimal 122.

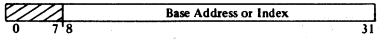
(3) Decimal Feature instructions. (4) System/360 assembler programs require these codes.

RR FORMAT



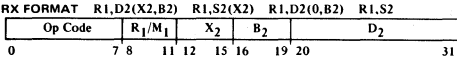
R1, R2 – meaningful for all RR instructions except SPM, SVC

BASE AND INDEX REGISTERS

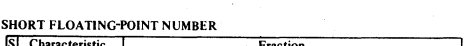


Decimal	Hexadecimal	Mnemonic	Graphic & Control Symbols BCDIC	EBCDIC	(2) 7-Track Tape BCDIC	Punched Card Code	System/360 8-Bit Code	(4)
64	40	STH		SP	(2)	no punches	0100 0000	
65	41	LA				12-0-1-9	0100 0001	
66	42	STC				12-0-2-9	0100 0010	
67	43	IC				12-0-3-9	0100 0011	
68	44	EX				12-0-4-9	0100 0100	
69	45	BAL				12-0-5-9	0100 0101	
70	46	BCT				12-0-6-9	0100 0110	
71	47	BC				12-0-7-9	0100 0111	
72	48	LH				12-0-8-9	0100 1000	
73	49	CH				12-1-8	0100 1001	
74	4A	AH	¢			12-2-8	0100 1010	
75	4B	SH	.	.	B A 8 2 1	12-3-8	0100 1011	
76	4C	MH	¤)	<	B A 8 4	12-4-8	0100 1100	
77	4D		¦	(	B A 8 4 1	12-5-8	0100 1101	(
78	4E	CVD	<	+	B A 8 4 2	12-6-8	0100 1110	+
79	4F	CVB	$	!	B A 8 4 2 1	12-7-8	0100 1111	
80	50	ST	& +	&	B A	12	0101 0000	
81	51					12-11-1-9	0101 0001	
82	52					12-11-2-9	0101 0010	
83	53					12-11-3-9	0101 0011	
84	54	N				12-11-4-9	0101 0100	
85	55	CL				12-11-5-9	0101 0101	
86	56	O				12-11-6-9	0101 0110	
87	57	X				12-11-7-9	0101 0111	
88	58	L				12-11-8-9	0101 1000	
89	59	C				11-1-8	0101 1001	
90	5A	A		!		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 1	0-1	0110 0001	
98	62					11-0-2-9	0110 0010	
99	63					11-0-3-9	0110 0011	
100	64					11-0-4-9	0110 0100	
101	65					11-0-5-9	0110 0101	
102	66					11-0-6-9	0110 0110	
103	67	MXD				11-0-7-9	0110 0111	
104	68	LD				11-0-8-9	0110 1000	
105	69	CD				0-1-8	0110 1001	
106	6A	AD				12-11	0110 1010	
107	6B	SD	.	.	A 8 2 1	0-3-8	0110 1011	
108	6C	MD	% (	%	A 8 4	0-4-8	0110 1100	
109	6D	DD	Y		A 8 4 1	0-5-8	0110 1101	
110	6E	AW	\	>	A 8 4 2	0-6-8	0110 1110	
111	6F	SW	**	?	A 8 4 2 1	0-7-8	0110 1111	
112	70	STE				12-11-0	0111 0000	
113	71					12-11-0-1-9	0111 0001	
114	72					12-11-0-2-9	0111 0010	
115	73					12-11-0-3-9	0111 0011	
116	74					12-11-0-4-9	0111 0100	
117	75					12-11-0-5-9	0111 0101	
118	76					12-11-0-6-9	0111 0110	
119	77					12-11-0-7-9	0111 0111	
120	78	LE				12-11-0-8-9	0111 1000	
121	79	CE				1-8	0111 1001	
122	7A	AE	b	:	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	√	"	8 4 2 1	7-8	0111 1111	

RX FORMAT R1,D2(X2,B2) R1,S2(X2) R1,D2(0,B2) R1,S2

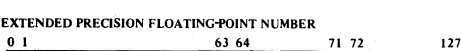


SHORT FLOATING-POINT NUMBER



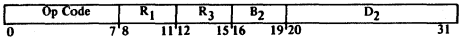
LONG FLOATING-POINT NUMBER – same as short floating-point number except fraction is longer – bits 8 through 63

EXTENDED PRECISION FLOATING-POINT NUMBER

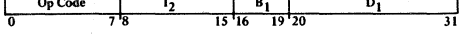


Decimal	Hexadecimal	Mnemonic	Graphic & Control Symbols BCDIC	Graphic & Control Symbols EBCDIC	(2) 7-Track Tape BCDIC	Punched Card Code	System/360 8-Bit Code
128	80	SSM				12-0-1-8	1000 0000
129	81			a		12-0-1	1000 0001
130	82	LPSW		b		12-0-2	1000 0010
131	83	(Diagnose)		c		12-0-3	1000 0011
132	84	WRD		d		12-0-4	1000 0100
133	85	RDD		e		12-0-5	1000 0101
134	86	BXH		f		12-0-6	1000 0110
135	87	BXLE		g		12-0-7	1000 0111
136	88	SRL		h		12-0-8	1000 1000
137	89	SLL		i		12-0-9	1000 1001
138	8A	SRA				12-0-2-8	1000 1010
139	8B	SLA				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		12-11-1	1001 0001
146	92	MVI		k		12-11-2	1001 0010
147	93	TS		l		12-11-3	1001 0011
148	94	NI		m		12-11-4	1001 0100
149	95	CLI		n		12-11-5	1001 0101
150	96	OI		o		12-11-6	1001 0110
151	97	XI		p		12-11-7	1001 0111
152	98	LM		q		12-11-8	1001 1000
153	99			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				12-11-4-8	1001 1100
157	9D	TIO				12-11-5-8	1001 1101
158	9E	HIO				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		11-0-2	1010 0010
163	A3			t		11-0-3	1010 0011
164	A4			u		11-0-4	1010 0100
165	A5			v		11-0-5	1010 0101
166	A6			w		11-0-6	1010 0110
167	A7			x		11-0-7	1010 0111
168	A8			y		11-0-8	1010 1000
169	A9			z		11-0-9	1010 1001
170	AA					11-0-2-8	1010 1010
171	AB					11-0-3-8	1010 1011
172	AC					11-0-4-8	1010 1100
173	AD					11-0-5-8	1010 1101
174	AE					11-0-6-8	1010 1110
175	AF					11-0-7-8	1010 1111
176	B0					12-11-0-1-8	1011 0000
177	B1					12-11-0-1	1011 0001
178	B2					12-11-0-2	1011 0010
179	B3					12-11-0-3	1011 0011
180	B4					12-11-0-4	1011 0100
181	B5					12-11-0-5	1011 0101
182	B6					12-11-0-6	1011 0110
183	B7					12-11-0-7	1011 0111
184	B8					12-11-0-8	1011 1000
185	B9					12-11-0-9	1011 1001
186	BA					12-11-0-2-8	1011 1010
187	BB					12-11-0-3-8	1011 1011
188	BC					12-11-0-4-8	1011 1100
189	BD					12-11-0-5-8	1011 1101
190	BE					12-11-0-6-8	1011 1110
191	BF					12-11-0-7-8	1011 1111

RS FORMAT R1,R3,D2(B2) } BXH, BXLE; R1,R3,S2 } LM, STM — R1,D2(B2) } Shift; R1,S2 } instructions



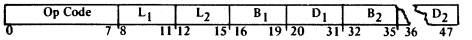
SI FORMAT D1(B1) } LPSW, SSM, HIO, SIO; S1 } TIO, TCH, TS — D1(B1),I2 } All other SI; S1,I2 } instructions



SS FORMAT INSTRUCTIONS

Decimal	Hexadecimal	Mnemonic	Graphic & Control Symbols BCDIC	Graphic & Control Symbols EBCDIC	(2) 7-Track Tape BCDIC	Punched Card Code	System/360 8-Bit Code
192	C0		?		B A 8 2	12-0	1100 0000
193	C1		A	A	B A 1	12-1	1100 0001
194	C2		B	B	B A 2	12-2	1100 0010
195	C3		C	C	B A 2 1	12-3	1100 0011
196	C4		D	D	B A 4	12-4	1100 0100
197	C5		E	E	B A 4 1	12-5	1100 0101
198	C6		F	F	B A 4 2	12-6	1100 0110
199	C7		G	G	B A 4 2 1	12-7	1100 0111
200	C8		H	H	B A 8	12-8	1100 1000
201	C9		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					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	B 1	11-1	1101 0001
210	D2	MVC	K	K	B 2	11-2	1101 0010
211	D3	MVZ	L	L	B 2 1	11-3	1101 0011
212	D4	NC	M	M	B 4	11-4	1101 0100
213	D5	CLC	N	N	B 4 1	11-5	1101 0101
214	D6	OC	O	O	B 4 2	11-6	1101 0110
215	D7	XC	P	P	B 4 2 1	11-7	1101 0111
216	D8		Q	Q	B 8	11-8	1101 1000
217	D9		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 (3)				12-11-6-8-9	1101 1110
223	DF	EDMK (3)				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	A 2	0-2	1110 0010
227	E3		T	T	A 2 1	0-3	1110 0011
228	E4		U	U	A 4	0-4	1110 0100
229	E5		V	V	A 4 1	0-5	1110 0101
230	E6		W	W	A 4 2	0-6	1110 0110
231	E7		X	X	A 4 2 1	0-7	1110 0111
232	E8		Y	Y	A 8	0-8	1110 1000
233	E9		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		0	0	8 2	0	1111 0000
241	F1	MVO	1	1	1	1	1111 0001
242	F2	PACK	2	2	2	2	1111 0010
243	F3	UNPK	3	3	2 1	3	1111 0011
244	F4		4	4	4	4	1111 0100
245	F5		5	5	4 1	5	1111 0101
246	F6		6	6	4 2	6	1111 0110
247	F7		7	7	4 2 1	7	1111 0111
248	F8	ZAP (3)	8	8	8	8	1111 1000
249	F9	CP (3)	9	9	8 1	9	1111 1001
250	FA	AP (3)				12-11-0-2-8-9	1111 1010
251	FB	SP (3)				12-11-0-3-8-9	1111 1011
252	FC	MP (3)				12-11-0-4-8-9	1111 1100
253	FD	DP (3)				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

SS FORMAT



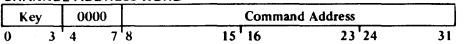
D1(L,B1),D2(B2) } NC, OC, XC, CLC
S1(L),S2 } MVC, MVN, MVZ
TR, TRT, ED, EDMK

D1(L1,B1),D2(L2,B2) } PACK, UNPK
S1(L1),S2(L2) } MVO, AP, CP
DP, MP, SP, ZAP

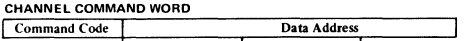
PACKED DECIMAL NUMBER | digit | digit | ---- | digit | digit | digit | sign |

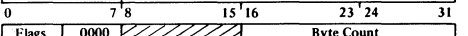
ZONED DECIMAL NUMBER | zone | digit | ---- | zone | digit | sign | digit |

CHANNEL ADDRESS WORD



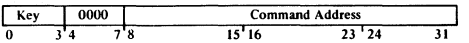
CHANNEL COMMAND WORD

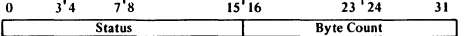




CD	Bit 32 (80) causes use of address portion of next CCW
CC	Bit 33 (40) causes use of command code and data address of next CCW
SLI	Bit 34 (20) causes suppression of possible incorrect length indication
SKIP	Bit 35 (10) suppresses transfer of information to main storage
PCI	Bit 36 (08) causes an interruption as Program Control Interrupt

CHANNEL STATUS WORD





32 (8000) Attention	40 (0080) Program-control interrupt
33 (4000) Status modifier	41 (0040) Incorrect length
34 (2000) Control unit end	42 (0020) Program check
35 (1000) Busy	43 (0010) Protection check
36 (0800) Channel end	44 (0008) Channel data check
37 (0400) Device end	45 (0004) Channel control check
38 (0200) Unit check	46 (0002) Interface control check
39 (0100) Unit exception	47 (0001) Chaining check

Byte Count: bits 48–63 form the residual count for the last CCW used.

DASD CHANNEL COMMAND CODES (see A26-5988 and A26-3599)

Command for CCW		Count	(M-T)Off Hex	(M-T)Off Dec	(M-T)On Hex	(M-T)On Dec
Control	No Op	(not zero)	03	03		
	Seek	6	07	07		
	Seek Cylinder	6	0B	11		
	Seek Head	6	1B	27		
	Set File Mask	1	1F	31		
	Space Count	(not zero)	0F	15		
	Transfer in Channel	X	X8			
	Recalibrate (Note 1)	(not zero)	13	19		
	Restore (2321 only)	X	17	23		
Sense	Sense I/O	6	04	04		
Switching	Release Device (Note 2)	(not zero)	94	148		
	Reserve Device (Note 2)	(not zero)	B4	180		
Search†	Home Address EQ	4 (usually)	39	57	B9	185
	Identifier EQ	5 (usually)	31	49	B1	177
	Identifier HI	5 (usually)	51	81	D1	209
	Identifier EQ or HI	5 (usually)	71	131	F1	241
	Key EQ	1 to 255	29	41	A9	169
	Key HI	1 to 255	49	73	C9	201
	Key EQ or HI	1 to 255	69	105	E9	233
	Key & Data EQ		2D	45	AD	173
	Key & Data HI		4D	77	CD	205
	Key & Data EQ or HI		6D	109	ED	237
Continue	Search EQ		25	37	A5	165
Scan	Search HI	(Note 3)	45	69	C5	197
	Search HI or EQ		65	101	E5	229
	Set Status Modifier*		35	53	B5	181
	Set Status Modifier*		7F	117	F5	245
	No Status Modifier		55	85	D5	213
Read†	Home Address	5	1A	26	9A	154
	Count	8	12	18	92	146
	Record R0		16	22	96	150
	Data	Number of bytes transferred	06	06	86	134
	Key & Data		0E	14	8E	142
	Count, Key & Data		1E	30	9E	158
	IPL		02	02		
Write	Home Address	5 (usually)	19	25		
	Record R0	8+KL+DL of R0	15	21		
	Count, Key & Data	8+KL+DL	1D	29		
	Special Count, Key & Data	8+KL+DL	01	01		
	Data	DL	05	05		
	Key & Data	KL+DL	0D	13		

*Sense byte determines which command is used. X=not significant
† M-T On = M-T Off except during Search and Read, bit 0=1 in M-T On.
Note 1. For 2311 or 2314 only. Note 2. Two-channel switch required except for a 2314/2844 combination.. Note 3. Include mask bytes in search argument; these commands are a special feature on 2841.

CHANNEL COMMAND CODES

Device	Command for CCW	8-Bit Code 0	1	2	3	4	5	6	7	Hex	Dec
1052	Read Inquiry BCD	0	0	0	0	1	0	1	0	0A	10
	Read Reader 2 BCD	0	0	0	0	0	0	1	0	02	02
	Write BDC, Auto Carriage Return	0	0	0	0	1	0	0	1	09	09
	Write BDC, No Auto Carriage Return	0	0	0	0	0	0	0	1	01	01
	No Op	0	0	0	0	0	0	1	1	03	03
	Sense	0	0	0	0	0	1	0	0	04	04
	Alarm	0	0	0	0	1	0	1	1	0B	11
2540	Read, Feed, Select Stacker SS — Type AA	S	S	D	0	0	0	1	0		
	Read — Type AB	1	1	D	0	0	0	1	0		
	Read, Feed (1400 compatability mode only)	1	1	D	1	0	0	1	0		
	Feed, Select Stacker SS — Type BA	S	S	1	0	0	0	1	1		
	PFR Punch, Feed, Select Stacker SS — Type BA	S	S	D	0	1	0	0	1		
	Punch, Feed, Select Stacker SS — Type BB	S	S	D	0	0	0	0	1		

SS	Stacker
00	R1
01	R2
10	RP3

D	Data Mode
0	EBCDIC
1	Column Binary

	M	M	M	M		8-Bit Code 0	1	2	3	4	5	6	7	Hex	Dec
1442 N1 Read	0	0	X		Eject and SS1	M	M	M	0	0	0	1	0		
Write						M	M	M	0	0	0	0	1		
Read	1	0	X		Eject and SS1	M	M	0	0	0	0	1	1		
Control						0	0	0	0	0	0	1	1		
Read	0	1	X		Eject and SS2	0	0	M	M	0	1	0	0		
No Op															
Read	1	1	X		Eject and SS2										
Sense															
Write	0	0	X		SS1										
Write	1	0	X		Eject and SS1										
Write	0	1	X		SS2										
Write	1	1	X		Eject and SS2										
Control	1	0			Eject and SS1										
Control	0	1			SS2										
Control	1	1			Eject and SS2										
Sense			1	1	Punch diagnostic										
Sense			0	1	Read diagnostic										

X = 0 means EBCDIC mode
X = 1 means Column Binary Mode

	8-Bit Code 0	1	2	3	4	5	6	7	Hex	Dec
1403 or 1443 Write, No Space	0	0	0	0	0	0	0	1	01	01
Write, Space 1 After Print	0	0	0	0	1	0	0	1	09	09
Write, Space 2 After Print	0	0	0	1	0	0	0	1	11	17
Write, Space 3 After Print	0	0	0	1	1	0	0	1	19	25
Write, Skip To Channel N After Print	1	C	H	A	N	0	0	1		
Diagnostic Read (1403)	0	0	0	0	0	0	1	0	02	02
Diagnostic Read (1443)	0	0	0	0	0	1	1	0	06	06
Sense	0	0	0	0	0	1	0	0	04	04
Carriage Control Space 1 Line Immediately	0	0	0	0	1	0	1	1	0B	11
Space 2 Line Immediately	0	0	0	1	0	0	1	1	13	19
Space 3 Line Immediately	0	0	0	1	1	0	1	1	1B	27
Skip To Channel N Immediately	1	C	H	A	N	0	1	1		
No Op	0	0	0	0	0	0	1	1	03	03

C	H	A	N	Channel
0	0	0	1	1
0	0	1	0	2
0	0	1	1	3
0	1	0	0	4
0	1	0	1	5
0	1	1	0	6
0	1	1	1	7
1	0	0	0	8
1	0	0	1	9
1	0	1	0	10
1	0	1	1	11
1	1	0	0	12

	8-Bit Code 0	1	2	3	4	5	6	7	Hex	Dec
UCS Allow buffer loading	1	1	1	0	1	0	1	1	EB	235
Load buffer (no Folding)	1	1	1	1	1	0	1	1	FB	251
Load buffer (folding)	1	1	1	1	0	0	1	1	F3	243
Block data check latch	0	1	1	1	0	0	1	1	73	121
Reset block data check latch	0	1	1	1	1	0	1	1	7B	129
2400 Tape* Read Backward (Overrides Data Converter On)	0	0	0	0	1	1	0	0	0C	12
Sense	0	0	0	0	0	1	0	0	04	04
Write	0	0	0	0	0	0	0	1	01	01
Read	0	0	0	0	0	0	1	0	02	02
Control	0	0	C	C	C	1	1	1		
	D	D	M	M	M	0	1	1		
	1	1	N	N	N	0	1	1		

N	N	N	
0	0	0	1600 bpi P.E. **
0	0	1	800 bpi NRZI

C	C	C	Control Codes	Hex	Dec
0	0	0	REW	7	7
0	0	1	RUN	0F	15
0	1	0	ERG	17	23
0	1	1	WTM	1F	31
1	0	0	BSR	27	39
1	0	1	BSF	2F	47
1	1	0	FSR	37	55
1	1	1	FSF	3F	63

*9 track op. forces 800 BPI and odd parity; also, it overrides 7 track but does not reset 7 track. Load/Sys Reset forces 7 track to 800 BPI, odd parity, data converter on, translator off.

** Reset condition

*** Set 9 Track mode, Models 4-6

D	D	7 Track Density
0	0	200
0	1	556
1	0	800**
1	1	***

7 Track

M	M	M	(Mode Modifiers)	Set Density	Set Odd Parity	Set Even Parity	Data Converter On	Data Converter Off	Translator On	Translator Off	Request TIE (Track in Error)
0	0	0	No Op								
0	0	1	Not Used								
0	1	0	Reset Condition	X	X		X			X	
0	1	1	Nine-track only								X
1	0	0		X		X		X		X	
1	0	1		X		X		X	X		
1	1	0	Reset Condition	X	X			X		X	
1	1	1		X	X			X	X		

HEXADECIMAL ADDITION, MULTIPLICATION, SUBTRACTION

HEXADECIMAL ADDITION

	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
1	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F	10	1
2	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F	10	11	2
3	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F	10	11	12	3
4	05	06	07	08	09	0A	0B	0C	0D	0E	0F	10	11	12	13	4
5	06	07	08	09	0A	0B	0C	0D	0E	0F	10	11	12	13	14	5
6	07	08	09	0A	0B	0C	0D	0E	0F	10	11	12	13	14	15	6
7	08	09	0A	0B	0C	0D	0E	0F	10	11	12	13	14	15	16	7
8	09	0A	0B	0C	0D	0E	0F	10	11	12	13	14	15	16	17	8
9	0A	0B	0C	0D	0E	0F	10	11	12	13	14	15	16	17	18	9
A	0B	0C	0D	0E	0F	10	11	12	13	14	15	16	17	18	19	A
B	0C	0D	0E	0F	10	11	12	13	14	15	16	17	18	19	1A	B
C	0D	0E	0F	10	11	12	13	14	15	16	17	18	19	1A	1B	C
D	0E	0F	10	11	12	13	14	15	16	17	18	19	1A	1B	1C	D
E	0F	10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	E
F	10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	F
	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	

HEXADECIMAL MULTIPLICATION

1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
2	04	06	08	0A	0C	0E	10	12	14	16	18	1A	1C	1E
3	06	09	0C	0F	12	15	18	1B	1E	21	24	27	2A	2D
4	08	0C	10	14	18	1C	20	24	28	2C	30	34	38	3C
5	0A	0F	14	19	1E	23	28	2D	32	37	3C	41	46	4B
6	0C	12	18	1E	24	2A	30	36	3C	42	48	4E	54	5A
7	0E	15	1C	23	2A	31	38	3F	46	4D	54	5B	62	69
8	10	18	20	28	30	38	40	48	50	58	60	68	70	78
9	12	1B	24	2D	36	3F	48	51	5A	63	6C	75	7E	87
A	14	1E	28	32	3C	46	50	5A	64	6E	78	82	8C	96
B	16	21	2C	37	42	4D	58	63	6E	79	84	8F	9A	A5
C	18	24	30	3C	48	54	60	6C	78	84	90	9C	A8	B4
D	1A	27	34	41	4E	5B	68	75	82	8F	9C	A9	B6	C3
E	1C	2A	38	46	54	62	70	7E	8C	9A	A8	B6	C4	D2
F	1E	2D	3C	4B	5A	69	78	87	96	A5	B4	C3	D2	E1

Comments:

HEXADECIMAL SUBTRACTION

b

a	-	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
	0	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
	1	F*	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E
	2	E*	F*	0	1	2	3	4	5	6	7	8	9	A	B	C	D
	3	D*	E*	F*	0	1	2	3	4	5	6	7	8	9	A	B	C
	4	C*	D*	E*	F*	0	1	2	3	4	5	6	7	8	9	A	B
	5	B*	C*	D*	E*	F*	0	1	2	3	4	5	6	7	8	9	A
	6	A*	B*	C*	D*	E*	F*	0	1	2	3	4	5	6	7	8	9
	7	9*	A*	B*	C*	D*	E*	F*	0	1	2	3	4	5	6	7	8
	8	8*	9*	A*	B*	C*	D*	E*	F*	0	1	2	3	4	5	6	7
	9	7*	8*	9*	A*	B*	C*	D*	E*	F*	0	1	2	3	4	5	6
	A	6*	7*	8*	9*	A*	B*	C*	D*	E*	F*	0	1	2	3	4	5
	B	5*	6*	7*	8*	9*	A*	B*	C*	D*	E*	F*	0	1	2	3	4
	C	4*	5*	6*	7*	8*	9*	A*	B*	C*	D*	E*	F*	0	1	2	3
	D	3*	4*	5*	6*	7*	8*	9*	A*	B*	C*	D*	E*	F*	0	1	2
	E	2*	3*	4*	5*	6*	7*	8*	9*	A*	B*	C*	D*	E*	F*	0	1
	F	1*	2*	3*	4*	5*	6*	7*	8*	9*	A*	B*	C*	D*	E*	F*	0

* = -1

b-a

CORE SIZES

K	Decimal	Hex	Core size
1	1024	400	
2	2048	800	
4	4096	1000	
8	8192	2000	
16	16384	4000	
32	32768	8000	
64	65536	10000	F
128	131072	20000	G
192	196608	30000	GF
256	262144	40000	H
384	393216	60000	HG
512	524288	80000	I
768	786432	C0000	IH
1024	1048576	100000	J
2048	2097152	200000	K
4096	4194304	400000	L
6144	6291456	600000	KL

SENSE BYTE MEANINGS

BYTE 0

BIT / DEVICE	0	1	2	3	4	5	6	7
1052, 2150	CMD REJ	INT REQ	BUS OUT	EQ CHK				
2540/ 2495	CMD REJ	INT REQ	BUS OUT	EQ CHK	DATA CHK		UNUSUAL CMD / POS CHECK	
1403/ 1443	CMD REJ	INT REQ	BUS OUT	EQ CHK	TYPE BAR	TYPE BAR		CH 9
1442, 2501 2520	CMD REJ	INT REQ	BUS OUT	EQ CHK	DATA CHK	OVER-RUN		
2671/ 2822	CMD REJ	INT REQ	BUS OUT	EQ CHK	DATA CHK			
2400	CMD REJ	INT REQ	BUS OUT	EQ CHK	DATA CHK	OVER-RUN	WRT CNT ZERO	DATA CNVTT CHK
2311/ 2841	CMD REJ	INT REQ	BUS OUT	EQ CHK	DATA CHK	OVER-RUN	TRK COND CHK	SEEK CHK
2301/ 2820	CMD REJ	INT REQ	BUS OUT	EQ CHK	DATA CHK	OVER-RUN		INVAL ADDR
2250	CMD REJ	SHOULD NOT OCCUR	BUS OUT	SHOULD NOT OCCUR	DATA CHK	SHOULD NOT OCCUR	BUFFER RUN-NING	SHOULD NOT OCCUR
2260	CMD REJ	INT REQ	BUS OUT	EQ CHK	SHOULD NOT OCCUR	SHOULD NOT OCCUR	SHOULD NOT OCCUR	SHOULD NOT OCCUR
2280/ 2282	CMD REJ	INT REQ	BUS OUT	EQ CHK	DATA CHK	SHOULD NOT OCCUR	SHOULD NOT OCCUR	ILLGL SEG
1419	CMD REJ	INT REQ	BUS OUT	NOT USED	DATA CHK	OVER-RUN	LATE READ	DOC SP ERR
2701, 2702	CMD REJ	INT REQ	BUS OUT	EQ CHK	DATA CHK	OVER-RUN	LOST DATA	TIME OUT
1287	CMD REJ	INT REQ	BUS OUT	EQ CHK	DATA CHK	OVER-RUN	NON-RECOV	KEYBD CORR

Comments:

BYTE 1

BIT / DEVICE	0	1	2	3	4	5	6	7
2400	NOISE	00-NON-XST TU 01-NOT READY 10-RDY& NO RWD 11-RDY& RWDNG		7 TRK	AT LOAD POINT	WRT STATUS	FILE PROTECT	TAPE IND
2311/ 2841	DATA CHK FLD	TRK OVER-RUN	END OF CYL	INVALID SEQ	NO REC FOUND	FILE PROT	MISSING ADDR MRKR	OVER-FLOW INL
2301/ 2820	DATA CHK IN COUNT	TRK OVER-RUN	END OF CYL	INVAL SEQ	NO REC FOUND	FILE PROT	SERVICE OVER-RUN	OVER-FLOW INL
2250	LIGHT PEN DETECT	END ORDER SEQ	CHAR MODE					
2280	READ COUNT CHK	FILM LOW	RECRDR FORCED GAP	SHOULD NOT OCCUR	SHOULD NOT OCCUR	2840 OUTPUT CHK	2840 INPUT CHK	GRAPHIC CHK
2282	READ COUNT CHK	FILM LOW	RECRDR FORCED GAP	FILM MOTION LIMIT	SHOULD NOT OCCUR	2840 OUTPUT CHK	2840 INPUT CHK	GRAPHIC CHK
1419	NOT USED	NOT USED	DOC UNDER RD HD	AMT FLD VALID	PROC CNTL VALID	ACCT NUM VALID	TRANSIT FLD VALID	SERIAL NUM VALID
1287	TAPE MODE	LATE STCK SEL	NO DOC FOUND	UNUSED	INVALID OP	UNUSED	UNUSED	UNUSED

BYTE 2

2400	BITS 0 - 7 INDICATE A TRACK IS IN ERROR						6 & 7 INDICATE NO ERROR OR MULTIERROR	
2311/ 2841	UNSAFE		SERIAL-IZER CHK	TAG LINE CHK	ALU CHK	UNSEL STATUS		
2301/ 2820	UNSAFE	SHIFT REG CHK	SKEW FAIL	CTR CHK	COMP CHK			
2250		BUFFER ADDRESS REGISTER						
		BIT 15	BIT 14	BIT 13	BIT 12	BIT 11	BIT 10	BIT 9
2280		BUFFER ADDRESS REGISTER						
		BIT 15	BIT 14	BIT 13	BIT 12	BIT 11	BIT 10	BIT 9
2282		BUFFER ADDRESS REGISTER						
		BIT 15	BIT 14	BIT 13	BIT 12	BIT 11	BIT 10	BIT 9

BYTE 3

BIT / DEVICE	0	1	2	3	4	5	6	7
2400	R/W VRC	LRCR	SKEW	CRC	SKEW REQ VRC		BKWD STATUS	COM-PARE
2311/ 2841	READY	ON LINE	READ SAFETY	WRITE SAFETY		END OF CYL		SEEK INCMPL
2301/ 2820	LRC BIT 0	LRC BIT 1	LRC BIT 2	LRC BIT 3				
2250	BUFFER ADDRESS REGISTER BIT 8	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1
2280	BUFFER ADDRESS REGISTER BIT 8	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1
2282	BUFFER ADDRESS REGISTER BIT 8	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1

BYTE 4

2400	ECHO ERR	RES TAPE UNIT	READ CLOCK ERR	WRITE CLOCK ERR	DELAY COUNTR ERR	SEQ IND C	SEQ IND B	SEQ IND A
2301/ 2820	SEQ IND 0	SEQ IND 1	SEQ IND 2	SEQ IND 3	SEQ IND 4	SEQ IND 5	SEQ IND 6	SEQ IND 7

BYTE 5

2311/ 2841	COMMAND IN PROGRESS WHEN OVERFLOW INCOMPLETE OCCURS OR ZERO
2301/ 2820	COMMAND IN PROGRESS WHEN OVERFLOW INCOMPLETE OCCURS WRITE = X'05' OR READ = X'06' ZERO

1287 SENSE INFORMATION

BYTE 0		BYTE 1
Bit 0	CMD REJ	Tape Mode
Bit 1	INT REQ	Late Stacker Sel
Bit 2	BUS-OUT CHK	No Document found
Bit 3	EQ CHK	Unused
Bit 4	DATA CHK	Invalid op
Bit 5	OVERRUN	Unused
Bit 6	Nonrecovery (Load light out)	Unused
Bit 7	KEYBD CORR (Tape only)	Unused

STATISTICS TABLE

The statistics table contains the statistical data required to maintain statistical data records. It is used by IBM-supplied error routines and the statistical data recorder (SDR) of SER.

The statistics table has the following characteristics:

1. Creation: The statistics table is created at system generation time.

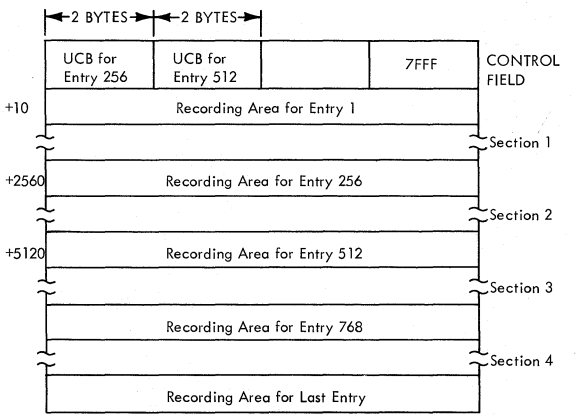
2. Storage Area: The table resides, as a permanent part of the resident supervisor, in protected resident storage (when protection is available).

3. Size: The statistics table contains a 10-byte control field (the first entry) and one 10-byte entry for each device. A 2314 is considered to be nine devices.

4. Means of Access: The UCB pointers in the control field are used to determine the section of the table in which the desired entry is located. If the desired entry is in other than section 1, a multiple of 256 (256 for section 2, 512 for section 3, etc.) is added to the STATAB index in the UCB. This is then multiplied by ten and added to the starting address of the statistics table to give the address of the proper entry. When the desired entry is in section 1, the STATAB index itself is multiplied by ten and added to the address of the statistics table. For the 2314, the low-order four bits of the fifth sense byte are also added to the STATAB index to get the correct entry.

5. Format: The format of each entry in the table varies with the type of device. The first 8 bytes of an entry contain statistical data; the last 2 bytes are a work area used by error routines. The device type formats are shown in "Statistics Table Entry Formats"; note that the work area is not shown:

STATISTICS TABLE INTERVENTION



Unit Record Equipment

1052 2150 1015	Temporary Read Failures	Temporary Write Failures
1285 1402		Bus-Out Check
1442 1404 2201	Equipment Check	Overrun
1403 1443	Device-Dependent	Device-Dependent
2501 2520 2671		
2701 2702		
7770 7772		
2250 2260		
1053 2280 2282		

1 byte

2400 Tape Series

1052 2150 1015	Temporary Read Failures	Temporary Write Failures
1285 1402		Bus-Out Check
1442 1404 2201	Equipment Check	Overrun
1403 1443	Word Count 0	Data Converter Check
2501 2520 2671	R/W Vertical Redundancy Check	Longitudinal Redundancy Check
2701 2702	Skew	Cyclic Redundancy Check
7770 7772	Skew Reg VRC	Noise
2250 2260		
1053 2280 2282		

1 byte

2841 Control Unit

Temporary Read Failures	Temporary Write Failures
	Bus-Out Check
Equipment Check	Overrun
Track condition	Seek Check
Unsafe	
Serializer, Deserializer	Control Unit Tag Line
Arithmetic Logical Unit	
Missing Address Marker	

1 byte

2820 Control Unit

Temporary Read Failures	Temporary Write Failures
	Bus-Out Check
Equipment Check	
Track Condition Check	
	Track Overrun
No Record Found	

2280

Temporary Read Failures	Temporary Write Failures
	Bus-Out Check
Equipment Check	
Byte Count 0	
Recorder Forced Gap	
	Graphics
Work Area	
Work Area	

OS SERVICE AID PROGRAMS

SERVICE AID DESCRIPTION

Service aids are designed to facilitate easier, quicker, and more efficient diagnosis or repair of a programming problem. There are PTF service aids (SAPGM PTF) and class A service aids.

HOW TO LOCATE SERVICE AIDS

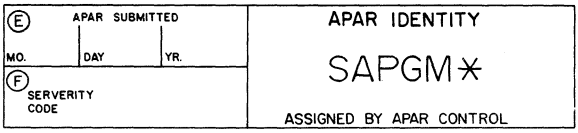
Announcement and maintenance information for service aids is maintained in RETAIN and in the Early Warning System's Program Symptom Index (EWS PSI) under the component ID of SAPGM for PTF service aids, and DN554 for class A service aids.

SAPGM SACOREZAP0	COREZAP0 IN-CORE SUPERZAP AVAIL AS PTF 1114-00	04A10 01114 XX.X
SAPGM SADELINK0	DELINK0 WITH MODULE EXPANSION ABILITY AVAIL AS PTF 1112-00	04A10 01112 XX.X
SAPGM SADELINK01	OC5ABEND, OR WRONG COND CODE WHEN RET TO SYS	04B09 01112 XX.X
SAPGM SAEXTEND20	EXTEND VER 2 AVAIL FOR 18.0 AS PTF 3605-00006-902	06C09 00006 XX.X

Detailed service aid information for program features, considerations, application, output, and messages is contained in Systems Reference Library, S/360 Service Aids, GC28-6719 for class A programs, and in PTF documentation for service aids distributed as PTF's (SAPGM PTF's).

HOW TO REPORT SERVICE AID TROUBLES

Service aid malfunctions not already reported in RETAIN can be reported through the normal APAR channels. Service aids with class A service are sent in the same way as any class A APAR. Service aid PTF's (SAPGM PTF's) are handled the same as class A APAR's except that the APAR identity box is marked SAPGM:



* SAPGM PTF's are intended to be tools for FE personnel only. APAR's will not be accepted from non-FE personnel.

Route APAR's for service aids to APAR CONTROL, P.O. Box 390, Dept. D29, Poughkeepsie, N.Y. 12602. San Jose originated aids go to IBM APAR PROC., Dept. E13, San Jose, Calif. 95114.

HOW THIS HANDBOOK IS ORGANIZED FOR SERVICE AIDS

This handbook is a reference aid only. It lists highlights for each service aid, and a brief summary of required JCL and control statements. The handbook assumes the reader is familiar with service aid details.

COREZAP	SAPGM PTF (note 1)
DELINK	SAPGM PTF (note 1)
EXTEND	SAPGM PTF (note 2)
FABDUMP	SAPGM PTF (note 2)
FLOWEDIT	SAPGM PTF (note 2)
IEHTRACE	SAPGM PTF (note 3)
IMAPTFLE (TLKEOT)	Class A
IMAPTFLS (PTFLIST)	Class A
IMASPZAP (SUPERZAP)	Class A
IMBMDMAP (LMODMAP)	Class A
IMCJQDMP (JOBQDUMP)	Class A
IMDPRDMP (PRNTDMP)	Class A
IMDSADMP (RESDUMP)	Class A
ISAMDUMP	SAPGM PTF (note 3)
REFMT	SAPGM PTF (note 1)
TFLOW	SAPGM PTF (note 2)
VABDUMP	SAPGM PTF (note 2)

Notes:

1. These PTF's are supported by FE Technical Operations, Dept. H71, Poughkeepsie, N.Y.

2. These PTF's are supported by Systems Development Division, Poughkeepsie, N.Y.

3. These PTF's are supported by FE Technical Operations, Dept. B56, San Jose, Calif.

COREZAP

COREZAP is supported by FE Technical Operations, Dept. H71, Poughkeepsie. COREZAP:

1. Verifies data in main storage.
2. Modifies data in main storage.
3. Dumps data in main storage.

JCL

//GO	EXEC	PGM=COREZAP [,PARM=' LINECNT=nn1]	Default nn is 55
//SYSPRINT	DD	SYSOUT=A	Print output
//SYSIN	DD	*	Control input

Control Statements

* comments	Asterisk (*) in col 1, with a blank in col 2, denotes a comment card that can be placed anywhere.
NAME NUCLEUS	Provides absolute addressing until next NAME or RESET verb.
NAME nnnnnnnn	Identifies module or ENTRY name nnnnnnnn to be operated on.
BASE bb	bb is hex value to be subtracted from address for NAME module.
INDEX bb	bb is hex value to be added to address for NAME module.
VERIFY ff dd	ff is hex offset to where hex data dd is to be compared.
VER ff dd	Shortened form of VERIFY ff dd.
REPLACE ff dd	ff is hex offset to where hex data dd is to be inserted.
REP ff dd	Shortened form for REPLACE ff dd.
RESET	Group delimiter. Resets NOGO switch. Simulates EOF.
DUMPB ff cc	DUMP before changes. ff is offset to start dump for cc bytes.
DUMP ff cc	Shortened form for DUMPB ff cc.
DUMPA ff cc	DUMP after changes. ff is offset to start dump for cc bytes.

Comments

DELINK

DELINK is supported by FE Technical Operations, Dept. H71, Poughkeepsie. DELINK:

1. Produces object module from load module.
2. Creates ESD for noneditable modules.
3. Expands module size for patch area.

JCL

//GO	EXEC	PGM=DELINK	
//SYSPRINT	DD	SYSOUT=A	Message output
//SYSPUNCH	DD	UNIT=00D	Object module output data set
//SYSLIB	DD	DSN=SYS1.SVCLIB, DISP=SHR	Origin of module to DELINK
//SYSIN	DD	*	Control statement input

Control Statements

Col 1 (each field delimited by at least one blank)
[>] module-name [CSECT-name] [new-size]

>(0-8-6 punch) -- Optional. Indicates that the module is to be expanded in size.

module-name -- Member name of the load module within the SYSLIB data set that is to be operated on by DELINK.

CSECT-name -- Optional unless > is in column 1. Identifies the control section within the module-name to be converted to an object module and produced on SYSPUNCH. Any added space is padded with blanks.

new-size -- Optional unless> is in column 1. Size is a 1-8 digit decimal number or 1-6 digit hex number (X'nnnnnn'). The size is the total size of the CSECT.

EXTEND

EXTEND is supported by Systems Development Division, Dept. D29, Poughkeepsie. EXTEND:

1. Increases the size of the system trace table.
2. Selectively shuts off an MVT trace table.
3. Dynamically SNAP-SHOTs the trace table.

JCL

//GO	EXEC	PGM=EXTEND [,PARM=(NOMSG,nnnn)] [,REGION=xxK]
//SYSLIB	DD	DSN=SYS1.SVCLIB, DISP=SHR IGG019X0 must be in SVCLIB.
//SNAPS	DD	SYSOUT=A, SPACE=(1024,(nnn,50))

NOMSG -- Nullifies all operator communication, including the SNAP function. EXTEND terminates automatically after the first job ABEND's.

EXTEND (Continued)

nnnn -- A decimal number requesting that the maximum number of trace table entries be built. This depends on available storage (see REGION). Either NOMSG or nnnn may appear alone in the PARM field. If nnnn is omitted, all available space is automatically used for a trace table in the REGION.

REGION -- Assigns the necessary amount of table space to EXTEND:

For MVT, REGION = (64e + 7200) ÷ 1024K
For MFT, PARTITION = (16e + 5100) ÷ 1024K
where e = desired number of trace table entries.

SPACE -- On the SNAPS DD card, must be sufficient to contain the desired number of SNAP shots of an extended trace table when a system WTR is being used (i.e., SYSOUT).

$$nnn = \frac{(138 \times \text{number of trace entries} \times \text{number of SNAP shots})}{1024}$$

Assignment directly to a printer (e.g., UNIT = 00 E) eliminates space considerations, and speeds output.

FABDUMP

FABDUMP is supported by SDD, Dept. D29, Poughkeepsie. Highlights are:

1. Formats data management control blocks.
2. Includes information for each open data set.
3. Blocks are formatted for each DDNAME.
4. Blocks included are: DEB, DCB, IOB, ICB, and UCB.

FABDUMP is applied to the system as module IGC0X05A in SYS1.SVGLIB. FABDUMP must be "connected" to ABDUMP by a SUPERZAP:

SUPERZAP "connection" for release 19 (microfiche IEAAAD02)

NAME	IGC0205A	Consult microfiche for displace-
VERIFY	03CC F3F0	ments on releases other than 19.
REP	03CC E7F0	

Example Output (right hand 16 bytes of each control block not shown)

```
MYDATA   DEB 03FC34   00000180  0403FCA4  C8000000  00000000  ....
                      5800222C  00000003  00030003  00030001  ....
                      0D000244  090002B5  0D0002B8  00001308  ....

         DCB 017698   00000000  00000000  00000000  000072E0  ....
                      04000001  00000000  0040D008  0003FC34  ....
                      00000000  00000000  00480000  00000001  ....

         UCB 00222C   0440FF88  0191000C  012B0100  00F1F9F1  ....
                      F0F00803  00320100  00000000  00000000  ....
```

Note: IOB not formatted because the preceding example is for an EXCP DCB.

FLOWEDIT

FLOWEDIT is supported by SDD, Dept. D29, Poughkeepsie. FLOWEDIT:

1. Formats and prints trace output from TFLOW service aid.
2. Can specialize data reduction by a user exit.
3. Can start edit and print at nth record.

JCL

//GO	EXEC	PGM=FLOWEDIT [,PARM='MSG=YES,BLOCKNO=nnnn, LINECT=yy,USR=ccc']
//SYSPRINT	DD	UNIT=00E Print data set. Can be SYSOUT.
//SYSUT1	DD	UNIT=2400,LABEL=(,NL),VOL=SER=TFLOW,DISP=OLD Trace input.

MSG -- NO is default if this keyword is omitted. YES causes messages to be written to the system console for manually controlling the SYSUT1 trace input tape. A reply, END, terminates FLOWEDIT.

BLOCKNO -- nnnn is 1 to 4 decimal digits specifying the physical record at which block processing is to be resumed. Default is 1 if the keyword is omitted and MSG=NO.

LINECT -- yy is 1 to 2 decimal digits specifying the number of lines to be printed per page on SYSPRINT. Default is 50 if the keyword is omitted.

USR -- ccc is a 1 to 8 character load module name of the exit program to be loaded by FLOWEDIT. User exits are explained in the detailed writeup, and are not discussed in this handbook.

IEHTRACE

IEHTRACE is supported by FE Technical Operations, Dept. B56, San Jose. IEHTRACE:

1. Provides a module flow or branch sequence trace.
2. May be invoked at job step initiation time.
3. May be invoked dynamically by the problem program.

JCL

//GO	EXEC	PGM=IEHTRACE,PARM='a,b,c,d,e,f'
//TRACEOUT	DD	SYSOUT=A
//.....	(DD cards for program that is being traced)	

PARM -- the parameters are positional:

a = option bytes (two bytes)
b = name of program to be traced.
c = number of trace entries (default of 1600 bytes).
d = RB name.
e = compare address.
f = parameters to be passed to program that is being traced.

IEHTRACE (Continued)

Options -- Byte 0:

Bit 0 = 0 -- Not last entry.
Bit 0 = 1 -- Last entry.
Bit 1 = 0 -- Enable the trace program.
Bit 1 = 1 -- Disable the trace program.
Bit 2 = 0 -- Do not delete until step termination.
Bit 2 = 1 -- Delete trace from core.
Bit 3 = 0 -- Trace only the task that invoked the trace program.
Bit 3 = 1 -- Trace all tasks.
Bit 4 = 0 -- Provide a branch trace.
Bit 4 = 1 -- Provide an RB queue name trace.
Bit 5 = 0 -- Do not invoke SNAP routine.
Bit 5 = 1 -- Invoke SNAP routine.
Bit 6 = 0 -- Trace problem program mode only.
Bit 6 = 1 -- Trace problem program and supervisor mode.
Bit 7 = 0 -- Do not trace across a LINK SVC if bit 6 = 0.
Bit 7 = 1 -- Trace across a LINK SVC if bit 6 = 0.

Byte 1:

Bit 0 -- Reserved.
Bit 1 = 1 -- Interrupt trace.
Bit 2 = 1 -- Force dump at end.
Bit 3 = 0 -- Reserved.
Bit 4 = 1 -- Record RB name in the trace table.
Bits 5-7 -- Reserved.

IMAPTFLE (TLKEDT)

IMAPTFLE is a class A program contained in SYS1.DN554 with DPPID distribution. IMAPTFLE:

1. Automatically produces JCL for PTF's.
2. JCL is tailored to target system.
3. Requires SYSGEN stage 1 output for target system.

JCL

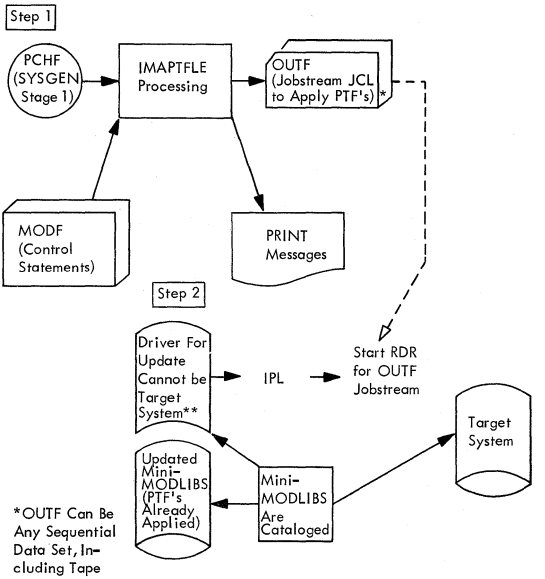
//GO	EXEC	PGM=IMAPTFLE	Formerly called TLKEDT.
//PRINT	DD	SYSOUT=A	Message data set.
//OUTF	DD	UNIT=00D	Output JOB stream from IMAPTFLE.
//PCHF	DD	UNIT=2400, LABEL=(, NL), DISP=OLD, VOL=SER=SYSGEN SYSGEN stage 1.	
//MODF	DD	*	Control statement input.

Control Statements (150 maximum per execution)

Col 1	Col 10	Col 19-71
Module-name	SSI	Comments, if any.

Module-name -- Name for which IMAPTFLE scans in the NAME cards of the stage 1 input (described by the PCHF DD card).

SSI -- SSI (from PTF cover letter) for the module. For example, PTF 360S-40069-008 "hits" module IEKQSM and the SSI for that module is 04114069.



IMAPTFLS (PTFLIST)

IMAPTFLS is a class A program contained in SYS1.DN554 with DPPID distribution. IMAPTFLS:

1. Lists modules with a PTF or local fix applied.
2. Lists PTF numbers contained in the system.
3. Summarizes data set physical characteristics.

JCL

//GO	EXEC	PGM=IMAPTFLS	Formerly called PTFLIST.
//SYSPRINT	DD	SYSOUT=A	Listing output data set.
//anyname1	DD	DSN=library-to-analyze, DISP=SHR	A DD for each library to analyze for PTF's.
//LISTREST	DD	DUMMY	Optional. Specific DD cards follow:
//anyname2	DD	DSN=library-to-list-all, DISP=SHR	A DD for each library to list completely.

IMAPTFLS (Continued)

anyname1 -- The DD card(s) that appear before the LISTREST DD card should describe data set(s) that are to be analyzed for any PTF/local fix(es) applied. The analysis is printed.

LISTREST -- Appears only if all SSI information for data sets in DD cards following LISTREST are to be completely listed.

anyname2 -- The DD card(s) that appear after the LISTREST DD card should describe data set(s) whose SSI is to be completely printed.

The "anyname" DD cards can have any DD name except LISTREST or SYSXXXXX (must not begin with the letters SYS because IMAPTFLS ignores this type of statement.)

IMASPZAP (SUPERZAP)

IMASPZAP is a class A program contained in SYS1.DN554 with DPPID distribution. IMASPZAP:

1. Inspects/modifies data in a load module of a PDS.
2. Inspects/modifies data in specific records of a VSAM data set.
3. Dumps entire data set, specific members of a PDS, or a record.

JCL

//GO	EXEC	PGM=IMASPZAP	Formerly SUPERZAP.
//SYSPRINT	DD	SYSOUT=A	Output print data.
//SYSLIB	DD	DSN=dsname, DISP=OLD,... (VOL, UNIT, etc)	Library to "hit". (Note 1)
//SYSIN	DD	*	Input control.

Control Statements
(when [CSECT] is omitted, the first CSECT in member is assumed)

* comments	Asterisk in col 1 with a blank in col 2 denotes a comment card that can be placed anywhere.
NAME member [CSECT]	Identifies a csect within a load module (member) for VERIFY, REP, SETSSI.
VERIFY location data	Location is hex offset (in multiple of 2) to where hex data is to be compared.
REP location data	Location is hex offset (in multiple of 2) to where hex data is to be inserted.
SETSSI xxyynnnn	Updates SSI in directory for member in NAME statement (Note 2).
DUMP member [CSECT]	Dump in hex. No RLD/ESD included. CSECT= 'ALL' for entire member.
DUMPT member [CSECT]	Same as DUMP, except that EBCDIC and instruction mnemonics are included.
CCHHR ccchhhhrr(hex)	Identifies a data record from SYSLIB for VERIFY, REP.
ABSDUMP/ccchhhhrr { ccchhhhrr, member, ALL }	Hex dump of all records. Can be by start/stop address, by member, or whole data set.
ABSDUMPT	Same as ABSDUMP, except EBCDIC and instruction mnemonics included.
BASE nn	nn is subtracted from the location specified on any subsequent VERIFY, REP.
CONSOLE	IMASPZAP operation is switched to the console. Reply 'END' to switch back.

IMASPZAP (Continued)

Notes:

1. When the SYSLIB data set to be accessed is the VTOC, code DSN = FORMAT4.DSCB.

2. If SETSSI is not used, IMASPZAP automatically sets the local fix flag in SSI.

IMBMDMAP (LMODMAP)

IMBMDMAP is a class A program contained in SYS1.DN554 with DPPID distribution. IMBMDMAP:

1. Produces maps showing CSECT's, entry points, locations and references.
2. Maps nucleus, any load modules or link pack area of MFT or MVT.
3. Maps consist of ESD and RLD items sorted numerically and alphabetically.
4. Link pack map consists of CDE entries sorted as in 5.
5. Basic map produces only the numeric listing by ESD.

JCL

//GO	EXEC	PGM = IMBMDMAP [, PARM = 'LINKPACK, BASIC, DEBUG, xxxxxx']
//SYSPRINT	DD	SYSOUT=x Print Data Set.
//anyname	DD	DSN=dsname(member), One for each Module DISP=SHR to be Mapped.
//SNAPDUMP	DD	SYSOUT=x Must be included if 'DEBUG' is specified.
//SYSABEND	DD	SYSOUT=x If 'DEBUG' is specified and an ABEND dump is desired.

LINKPACK -- Specifies that map of the link pack area MVT/MFT is to be produced. In order to obtain a map of all LINKPACK modules, a map of the nucleus currently in core must be run concurrently.

BASIC -- Specifies that only the ESD numeric listing is to be produced.

DEBUG -- See IMBMDMAP service aid details.

xxxxxx -- 1 to 6 character hex address specifies that the map is to be relocated to an address other than zero. This will affect all maps in that execution except the SYS1.NUCLEUS data set.

IMCJQDMP (JOBQDUMP)

IMCJQDMP is a class A program contained in SYS1.DN554 with DPPID distribution. IMCJQDMP:

1. Provides a formatted dump of SYS1.SYSJOBQE.
2. Operates independently (stand-alone); contents of job queue are unchanged.
3. Output is directed to tape or printer.
4. Provides ability to select specific QCR's and/or jobnames.

IPL after WAIT state, press request key. Program prints:

```
ENTER O=XXXD, Q=YYY(, S) OR PRESS INTERRUPT KEY FOR O=00E, Q=191
```

Reply (or press EXT INTRPT key for default).

```
O=xxxd, Q=yyy, SELECT
```

xxx -- The address of the output device.

d -- Indicates output device type; if omitted, assumes that a 1403 Printer is being used.

yyy -- The device on which the SYS1.SYSJOBQE has been mounted.

SELECT -- Indicates selective rather than full printing, and the message:

```
SPECIFY SELECT PARAMETERS
```

will be issued.
QCR=, JOBNAME=, and END are the parameters.

QCR -- The QCR parameters are mutually exclusive.

ASB

CLASS = y -- Where y is replaced with A through O.

FREE

HOLD

RJE

SYSOUT = x -- Where x is replaced with one of the 36 output classes.

JOBNAME = (w, x, y, z) -- Up to four jobnames may be specified.

END -- When all requests have been fulfilled, reply with this parameter.

When using tape for output, IMCJQDMP writes 121-byte records on nonlabeled tape, the first character of which is a machine control character. IEBPTPCH may be used to print the tape with the following SYSUT1 DD and IEBPTPCH control cards:

```
//SYSUT1  DD  UNIT=2400,LABEL=(,NL),VOL=SER=JQDMP,
//           DISP=(OLD,KEEP),DCB=(RELFM=F,BLKSIZE=121,
//           LRECL=121)

                PRINT   PERFORM = M
```

IMDPRDMP (PRNTDMP)

IMDPRDMP is a class A program contained in SYS1.DN554 with DPPID distribution. IMDPRDMP:

1. Formats and prints the output produced from IMDSADMP.
2. Formats similar to a system ABEND dump.
3. Control information may be entered from reader or console.
4. Optionally uses direct-access workfile for faster access to DUMP.

JCL

```
//GO        EXEC  PGM=IMDPRDMP,PARM='a,T,
                  BUFnnn,S                    Formerly PRNTDMP.
//TAPE      DD    DSN=DUMP1,VOL=SER=DUMPIN,   Input.
                  LABEL=(,NL),
//                DISP=OLD,UNIT=2400
//PRINTER   DD    SYSOUT=A                    Primary output.
//SYSPRINT  DD    SYSOUT=A                    Message data set.
//SYSUT1    DD    UNIT=SYSDA,SPACE=           n=(coresize/2048)+1
                  (2052,(n,10))
//SYSIN     DD    *                           Control cards.
```

PARM: a -- Program action to be taken in event of exceptional condition.

0 -- Print nucleus if format error, permanent I/O error, or program check.

1 -- Print the tape if error is as specified above (DEFAULT).

2 -- Read next card from SYSIN (if present) or request control verbs from operator if error is as specified above.

T -- Causes a WTOR requesting a dump title and number.

BUFnnn -- Maximum buffers for reading tape. Actual number is determined by available core. Each buffer is 2052 bytes. nnn may be any number from 1 to 255. Default assigned is 255.

S -- Causes a WTOR. A reply of STOP ceases operation on the current tape and the operator can begin new operations. S is ignored on PCP.

Control Statements

Function verbs:

FILEnn	Requests immediate positioning to file nn (01 to 99).
NEWTAPE	Requests that current tape be dismounted and a new tape accepted.
GO	Requests the default format verbs. The GO verb may be altered by the previous use of the ONGO verb. The defaults are QCBTRACE, LPAMAP, FORMAT, and PRINT ALL. The GO verb must be last on a card or in a reply.
ONGO	Sets the default verb set for the GO verb. The parameters may consist of any of the format verbs separated by commas with a PRINT and its parameters last. The ONGO verb must be last on a card or in a reply and must be separated from its parameters by at least one blank.
TITLE	Sets the title used at the top of each page of the DUMP. The verb and the parameter must be separated by at least one blank. This verb must be the last on a card or in a reply.
END	Terminates IMDPRDMP. All subsequent verbs are ignored.
CVT = {hhhhhh / P}	Allows operator to specify address of CVT in the dump system if X'4C' was destroyed.
CVT = P	Specifies that the value in X'4C' of the current system is used.
CVT = hhhhhh	hhhhhh is a one to six digit hex address of the CVT.

Format verbs:

QCBTRACE	Requests a trace of the QCB's of the dumped system.

LPAMAP	Requests a map of the modules in the link pack area.
FORMAT	Requests formatting similar to SYSABEND for major control blocks for all job step and system tasks in the dumped system.
PRINT	Determines which areas of core are printed in the unformatted portion of the dump. The verb and the first parameter must be separated by at least one blank. Multiple parameters must be separated by commas.
ALL	Causes nucleus, SQS, and all allocated regions to be printed.
CURRENT	Prints only the core associated with the current task.
NUCLEUS	Prints the nucleus and SQS and both prefixes for MP65.
STORAGE = (beg1,end1,...begn,begn)	Prints storage located between each 'beg,end' pair. Addresses should be in hex. If an ending address is omitted, all core is printed starting with the 'beg' address. If STORAGE is specified with no parameters, all core storage is printed.
JOBNAME = (name1,name2,....name10)	Core associated with each specified jobname will be printed. A maximum of ten (10) may be specified.
F03	Prints core associated with any task terminated by DAR.

Notes:

1. All verbs must be separated by commas.

2. Verbs and their parameters may be entered from console in uppercase or lowercase. Abbreviations are acceptable for all verbs except FILEnn. Any truncation of the correct spelling is acceptable.

Sample

```
//IMDPRDMP  JOB   19,SAPGM,MSGLEVEL=1
//GO        EXEC  PGM=IMDPRDMP,PARM='2,T'
//TAPE      DD    DSN=DUMP,VOL=SER=IBM,LABEL=(,NL),DISP=
                  (OLD,KEEP)
//                UNIT=2400
//PRINTER   DD    SYSOUT=A,SPACE=(CYL,(10,1))
//SYSUT1    DD    UNIT=SYSDA,DISP=NEW,SPACE=(2052,(257,10))
//SYSABEND  DD    SYSOUT=A
//SYSIN     DD    *
ONGO
GO
NEWTAPE,
GO FILE01,
Q, END
/*
```

IMDSADMP (RESDUMP)

IMDSADMP is a class A program contained in SYS1.DN554 with DPPID distribution.

1. High-speed or low-speed stand-alone dumps.
2. High-speed dumps can be printed by IMDPRDMP.
3. Tape output can only be on 9-track.
4. IMDSADMP is accomplished in two stages.
5. Stage 1 is a macro that punches control cards for stage 2.
6. Stage 2 initializes the desired tape or direct-access volume.

Prototype

Symbol* IMDSADMP IPL=,START=,TYPE=,PROTECT=,OUTPUT=

*Must not be used for IPL=TAPE.

IPL	Describes type of device upon which the dump program resides. If IPL = TAPE is selected, all keywords (except PROTECT) are ignored, TYPE = HI is generated and OUTPUT goes to the same volume on which the dump program resides.
TAPE	Generates a high-speed dump to reside on and be IPL'ed from tape.
ddd	Specifies that the dump program resides on and is IPL'ed from a direct-access device. ddd is the address of a device that must be mounted during stage 2 initialization.
191	The default for the IPL keyword.
START	Determines the starting location from which the stand-alone dump program is loaded into core. Valid only if TYPE = LO is also coded. For TYPE = HI, START = X'80' is assigned.
nnn	Specifies a decimal number. Should be 584 or higher.
X'hhh'	Specifies a hexadecimal address. Should be X'248' or higher.
X'F00'	The default value assigned.
TYPE	Specifies the version of dump desired:
HI	Specifies that a high-speed dump program is desired. Output is core image.
LO	Specifies that a low-speed dump program is desired. Output is EBCDIC to tape or printer. LO is the default value.
PROTECT	Specifies whether the storage protect feature is available on the CPU on which the stand-alone dump program is executed: NO - Storage Protect is not available. YES - Storage Protect is available. YES is the default.

IMDSADMP (Continued)

OUTPUT — Specifies the output device on which the dump is to be taken. (For TYPE=HI, OUTPUT must be a tape device:
Tttt - The device address of the tape output device.
Pppp - The device address of the printer output device.
P00E - The default.

ISAMDUMP

ISAMDUMP is supported by FE Technical Operations, Dept. B56, San Jose.
ISAMDUMP:

1. Provides a formatted dump of an ISAM data set.
2. Is executed independently or from a problem program with LINK macro.

JCL

//GO	EXEC	PGM=ISAMDUMP,PARM='IPOTLxxMxx'	
//ISAMDUMP	DD	DSN=ISAM, DCB=DSORG=IS,DISP=OLD	ISAM data set
//		UNIT=SYSDA,VOLUME=SER=SCRTCH	To be dumped
//ISAMPRT	DD	SYSOUT=A	Dump output

PARM: I - High level indexes are dumped.

P - Prime data records, track indexes, and cylinder overflow records are dumped.

O - Independent overflow records are dumped.

T - Track index entries are dumped without prime data records or cylinder overflow records.

Lxx - Causes the last xx prime cylinders to be dumped.

Mxx - Causes the last xx independent overflow cylinders to be dumped.

'IPO' are the default parameters. The parameters may be used in any combination and in any order.

REFMT

REFMT is supported by FE Technical Operations, Dept. H71, Poughkeepsie.
REFMT:

1. Reformats DAR dumps in SYS1.DUMP to allow IMDPRDMP formatting.
2. Optionally resets SYS1.DUMP after reformatting.
3. Allows IMDPRDMP processing directly from direct access (no tape).

JCL

//GO	EXEC	PGM=REFMT[, PARM='RESET']	Code PARM to reset SYS1.DUMP
//SYSPRINT	DD	SYSOUT=A	Output messages
//SYSUT1	DD	DSN=SYS1.DUMP,DISP=SHR	DAR dump data set
//SYSUT2	DD	DSN=DARDUMP,UNIT=SYSDA,	Reformatted data set
//		DISP=(,CATLG), SPACE=(2052,(N,10))	n=(coresize/2048)+1

SYSUT1 is an example of a core image dump on direct access (cataloged).

SYSUT2 is an example of a reformatted dump to a direct-access data set. The reformatted output is then processed by IMDPRDMP as follows:

Post Processing by IMDPRDMP

//GO	EXEC	PGM=IMDPRDMP	Default PARM='1, BUF255'
//SYSPRINT	DD	SYSOUT=A	Messages
//PRINTER	DD	UNIT=00E	Formatted dump. Can be SYSOUT.
//SYSUT1	DD	DSN=DARDUMP, DISP=OLD	From REFMT output (See note).
//SYSIN	DD	*	Input control statements.
GO			Defaults to Q,L,F,P ALL
END			End control stream
/*			

Note: SYSUT1 should not be UNCATLG or DELETEd until dump output is verified.

TFLOW

TFLOW is supported by SDD, Dept. D29, Poughkeepsie. Highlights are:

1. Continuously traces system interrupts and module flow.
2. No trace table required in system -- TFLOW is self-hooking.
3. Very low degradation on system throughput.
4. User exit capability and user trace facility.

JCL

(High dispatching priority should be assigned to TFLOW)

//GO	EXEC	PGM=TFLOW, TIME=1440, PARM='ALL DEFAULT, FETCH, PCI, USR=nnnn'
//SYSLIB	DD	DSN=SYS1.SVCLIB, DISP=SHR IGG019X0 must be in SVCLIB.
//TRACEOUT	DD	UNIT=2400, LABEL=(, NL), VOL=SER=TFLOW, DISP=(, KEEP) trace output. Trace output tape may be labeled. If 7-track, code DCB=(TRTCH=C).

ALL — Optional. Trace starts immediately, including start I/O traces.

DEFAULT — Optional. Mutually exclusive with ALL. Trace starts when IBMTEST, step GO, is active. Start I/O is included. If neither ALL nor DEFAULT is coded, operator messages request information for: start I/O trace, jobname to start trace, stepname to start trace if a jobname was selected, and YES or NO to stop trace on an ABEND for jobname.

FETCH — Normally, program FETCH activity is not traced (fills trace output with information not normally needed). Code this parameter if a FETCH trace is desired.

TFLOW (Continued)

PCI	PCI is not normally traced because of the critical timing of PCI appendages. Code this parameter if a PCI trace is desired; system result may be unpredictable.
USR	nnnn is a 1 to 8 character module name that is LOADed by TFLOW as an exit program. Exits are not explained in this handbook.

Control Message

```
TFLOW-TO MANUALLY CONTROL TRACING, REPLY AT ANY TIME WITH ON,
OFF, END OR CNT
```

The above message is a WTOR and is always outstanding at execution. It provides the user with a manual method of control. END terminates TFLOW. CNT causes the physical block count for the current TRACEOUT volume. This count can serve as a "checkpoint" to determine where to start editing with the data reduction service and FLOWEDIT. TFLOW terminates with a dump if ABE reply is given. The physical block count is automatically printed every 200 blocks written on TRACEOUT.

VABDUMP

VABDUMP is supported by SDD, Dept. D29, Poughkeepsie. Highlights are:

1. Formats data management control blocks.
2. Includes information for each open data set.
3. Blocks are formatted for each DDNAME.
4. Blocks included are DEB, DCB, IOB, ICB, and UCB.

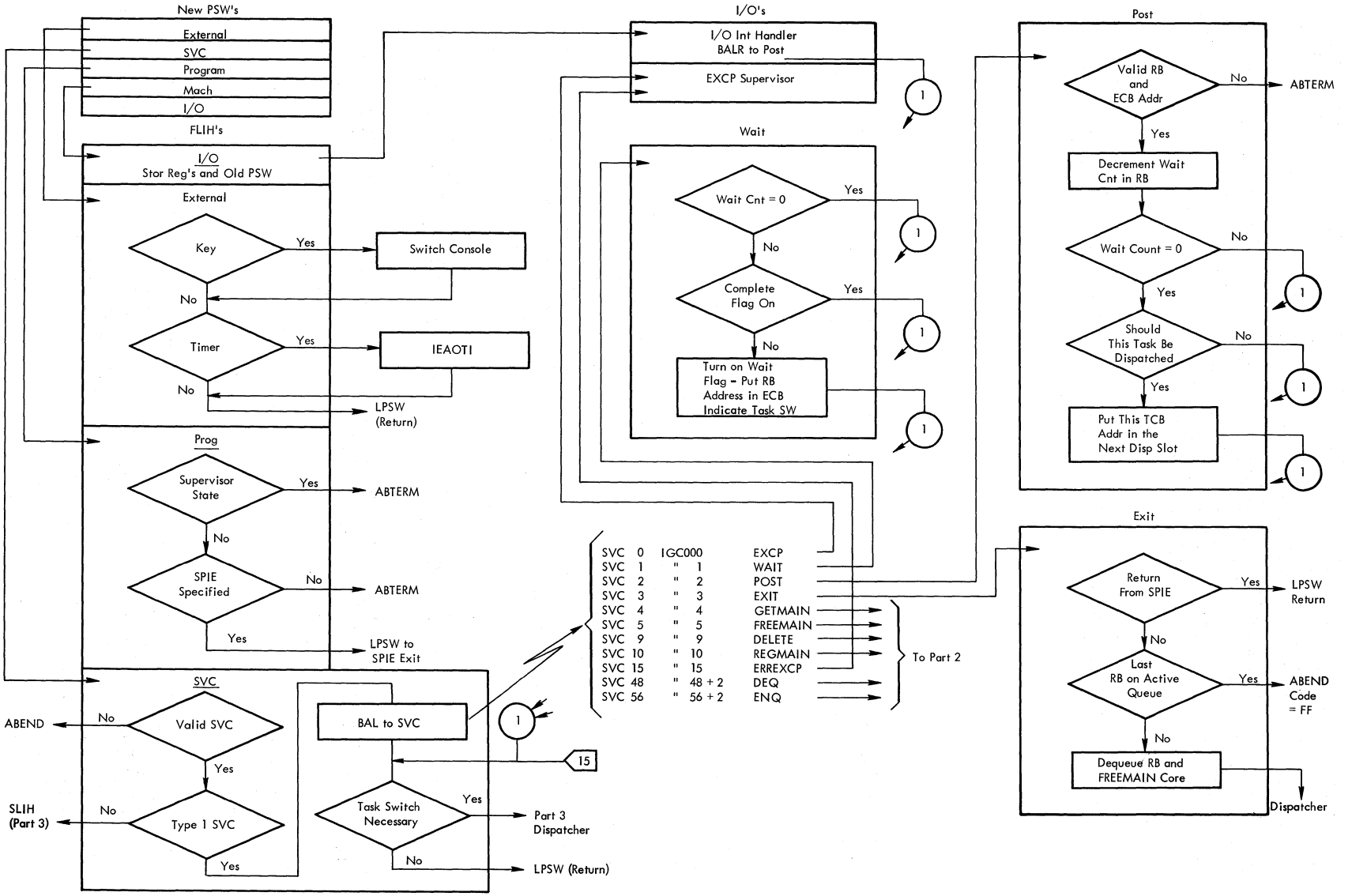
VABDUMP is applied to the system as module IGC0V05A in SYS1.SVCLIB and must be "connected" to ABDUMP by a SUPERZAP:

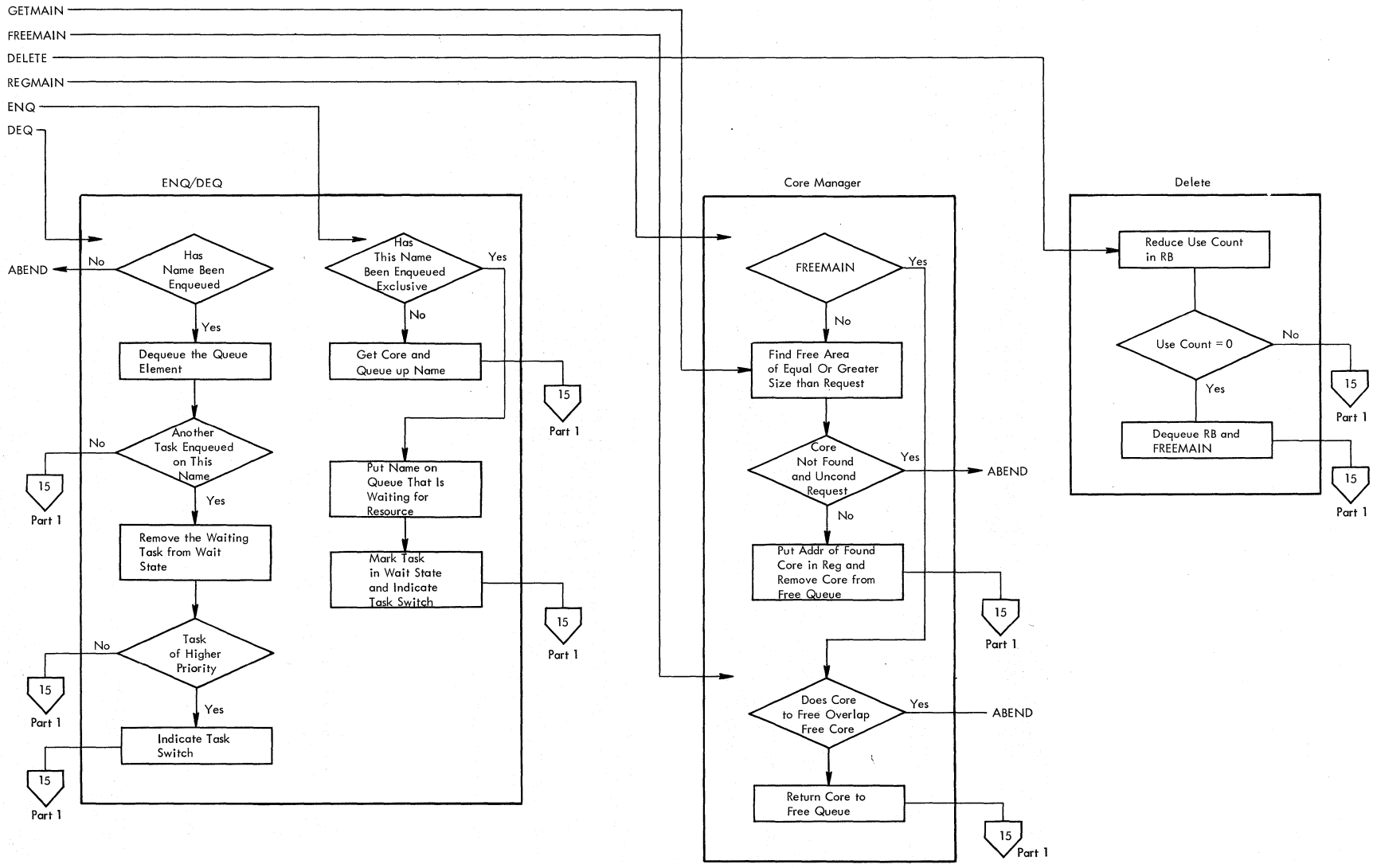
SUPERZAP "connection" for release 19 (microfiche IEAQAD02)

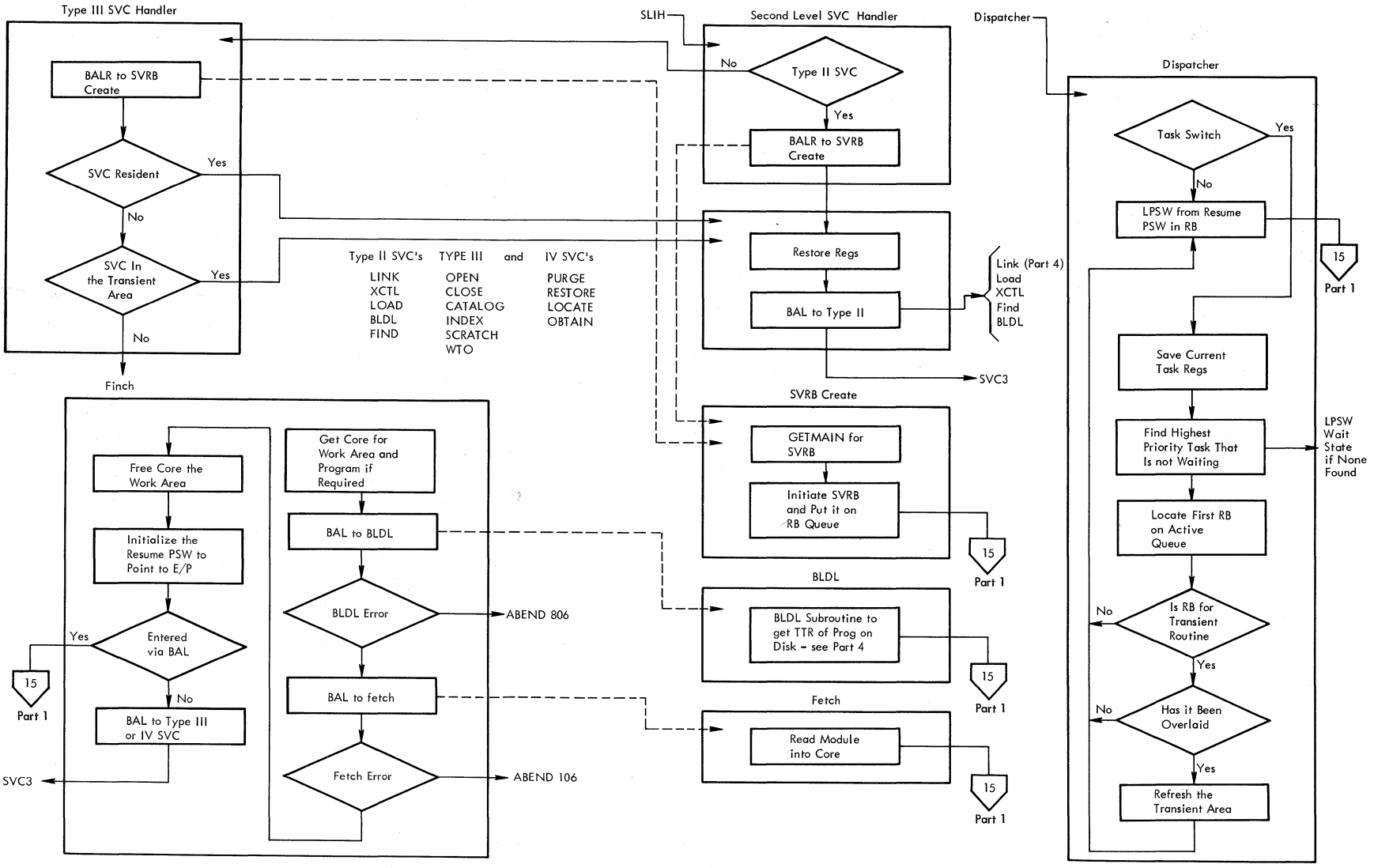
```
NAME      IGC0205A
VERIFY    0308    F3F0
REP       0308    E5F0
DUMPT     IGC0205A
```

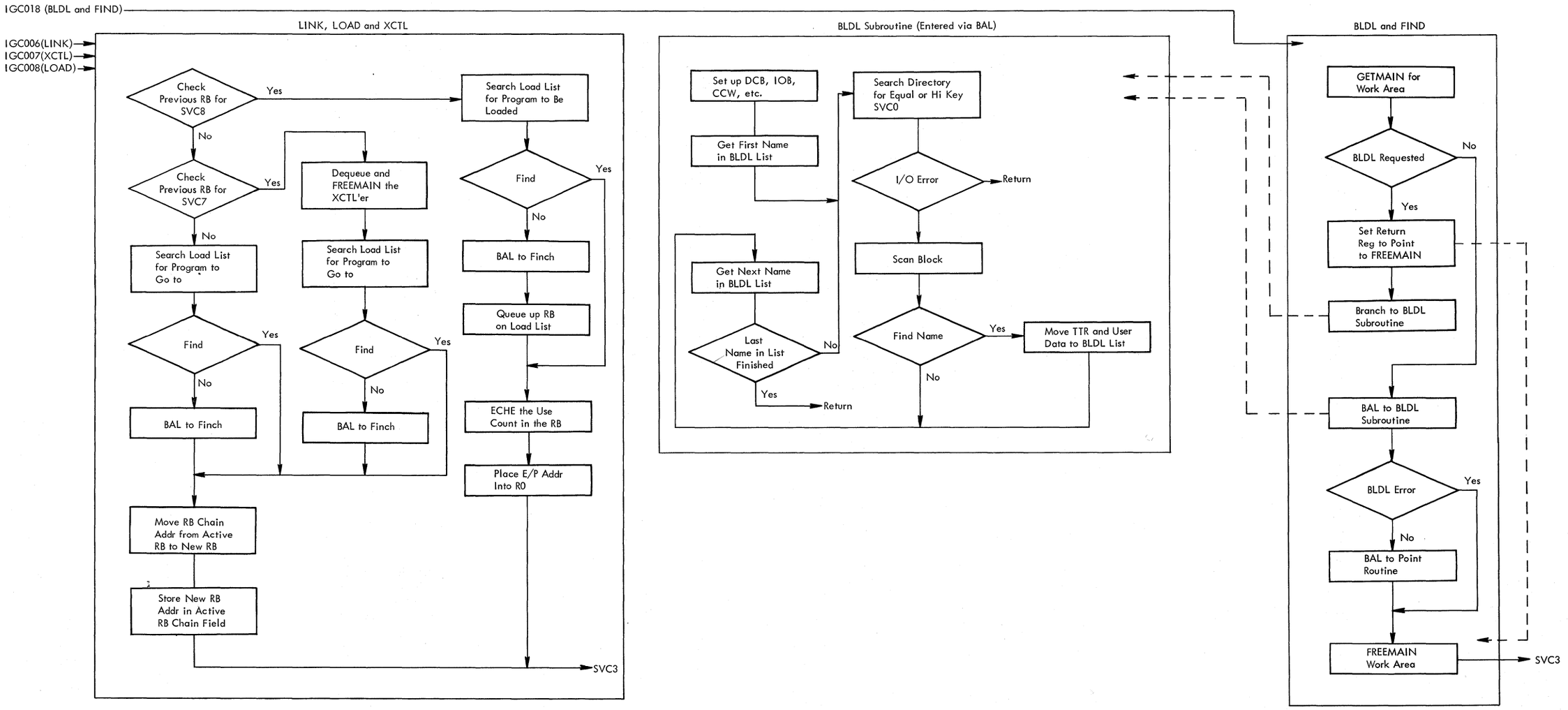
Example Output (right hand 16 bytes of each control block not shown)

```
MYDATA   DEB   03FCA4   04000180  0403FD14  C8000000  0F000000
                        1800222C  00000003  00010003  00020002
                        0003FAF8  000054B8  8000559C  00001308

         DCB   017638   00000000  14000000  00030001  000072E0
                        04000001  80000000  002C0050  0C03FCA4
                        28050040  4203F760  0003F918  0003F8C8

         IOB   03F710   00000048  7F000000  0003F760  0003F7A8
                        0003F748  00017638  00000000  00000000
                        0803F748  00000000  08000000  00000000
```

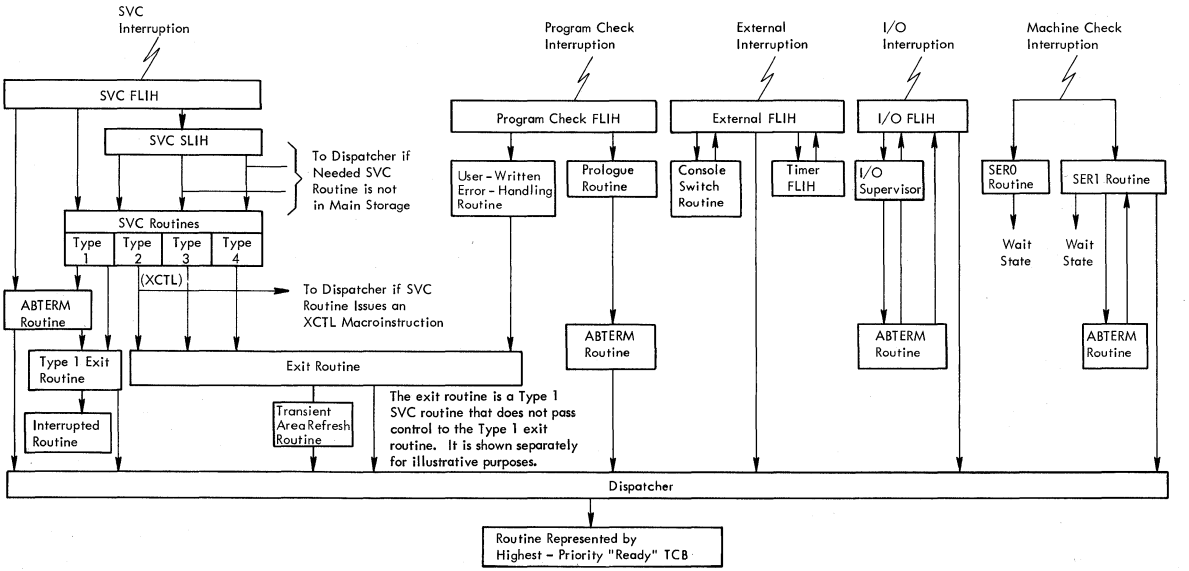

New PSW's
External
SVC
Program
Mach
I/O
FLIH's
I/O
Stor Reg's and Old PSW
External
Key
Yes
Switch Console
No
Timer
Yes
IEAOTI
No
LPSW
(Return)
Prog
Supervisor
State
Yes
ABTERM
No
SPIE
Specified
No
ABTERM
Yes
LPSW to
SPIE Exit
SVC
ABEND
No
Valid SVC
Yes
SLIH
(Part 3)
No
Type 1 SVC
Yes
BAL to SVC
1
15
Task Switch
Necessary
Yes
Part 3
Dispatcher
No
LPSW (Return)
I/O's
I/O Int Handler
BALR to Post
EXCP Supervisor
1
Wait
Wait Cnt = 0
Yes
No
Complete
Flag On
Yes
No
Turn on Wait
Flag - Put RB
Address in ECB
Indicate Task SW
1
1
1
SVC 0 IGC000 EXCP
SVC 1 " 1 WAIT
SVC 2 " 2 POST
SVC 3 " 3 EXIT
SVC 4 " 4 GETMAIN
SVC 5 " 5 FREEMAIN
SVC 9 " 9 DELETE
SVC 10 " 10 REGMAIN
SVC 15 " 15 ERREXCP
SVC 48 " 48 + 2 DEQ
SVC 56 " 56 + 2 ENQ
To Part 2
Post
Valid RB
and
ECB Addr
No
ABTERM
Yes
Decrement Wait
Cnt in RB
Wait Count = 0
No
Yes
Should
This Task Be
Dispatched
No
Yes
Put This TCB
Addr in the
Next Disp Slot
1
1
1
Exit
Return
From SPIE
Yes
LPSW
Return
No
Last
RB on Active
Queue
Yes
ABEND
Code
= FF
No
Dequeue RB and
FREEMAIN Core
Dispatcher

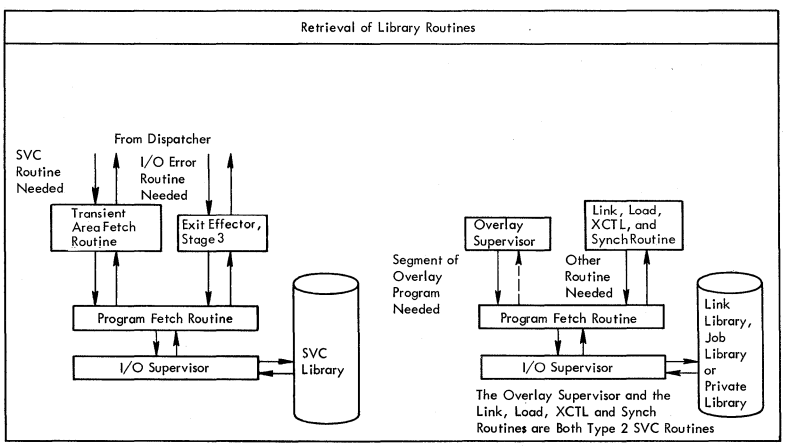

GETMAIN
FREEMAIN
DELETE
REGMAIN
ENQ
DEQ
ENQ/DEQ
Has Name Been Enqueued
No
ABEND
Yes
Dequeue the Queue Element
Another Task Enqueued on This Name
No
15
Part 1
Yes
Remove the Waiting Task from Wait State
Task of Higher Priority
No
15
Part 1
Yes
Indicate Task Switch
15
Part 1
Has This Name Been Enqueued Exclusive
Yes
No
Get Core and Queue up Name
15
Part 1
Put Name on Queue That Is Waiting for Resource
Mark Task in Wait State and Indicate Task Switch
15
Part 1
Core Manager
FREEMAIN
Yes
No
Find Free Area of Equal Or Greater Size than Request
Core Not Found and Uncond Request
Yes
ABEND
No
Put Addr of Found Core in Reg and Remove Core from Free Queue
15
Part 1
Does Core to Free Overlap Free Core
Yes
ABEND
Return Core to Free Queue
15
Part 1
Delete
Reduce Use Count in RB
Use Count = 0
No
15
Part 1
Yes
Dequeue RB and FREEMAIN
15
Part 1

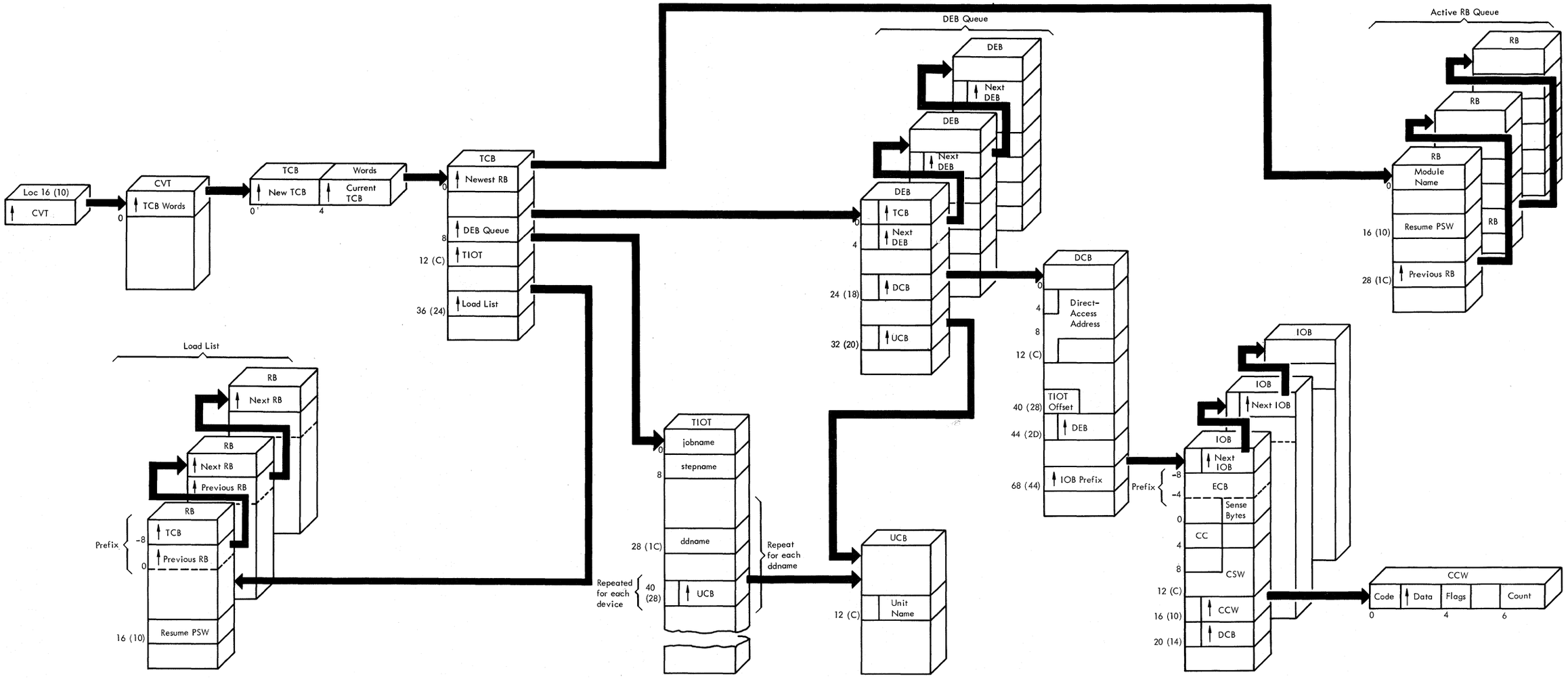

Type III SVC Handler
BALR to SVRB Create
SVC Resident
Yes
No
SVC In the Transient Area
Yes
No
Finch
SLIH
Second Level SVC Handler
No
Type II SVC
Yes
BALR to SVRB Create
Restore Regs
BAL to Type II
Link (Part 4)
Load
XCTL
Find
BLDL
SVC3
Type II SVC's
LINK
XCTL
LOAD
BLDL
FIND
TYPE III and IV SVC's
OPEN
CLOSE
CATALOG
INDEX
SCRATCH
WTO
PURGE
RESTORE
LOCATE
OBTAIN
SVRB Create
GETMAIN for SVRB
Initiate SVRB and Put it on RB Queue
15
Part 1
BLDL
BLDL Subroutine to get TTR of Prog on Disk - see Part 4
15
Part 1
Fetch
Read Module into Core
15
Part 1
Free Core the Work Area
Initialize the Resume PSW to Point to E/P
Entered via BAL
Yes
15
Part 1
No
BAL to Type III or IV SVC
SVC3
Get Core for Work Area and Program if Required
BAL to BLDL
BLDL Error
ABEND 806
BAL to fetch
Fetch Error
ABEND 106
Dispatcher
Dispatcher
Task Switch
Yes
No
LPSW from Resume PSW in RB
15
Part 1
Save Current Task Regs
Find Highest Priority Task That Is not Waiting
LPSW Wait State if None Found
Locate First RB on Active Queue
No
Is RB for Transient Routine
Yes
No
Has it Been Overlaid
Yes
Refresh the Transient Area


IGC018 (BLDL and FIND)
LINK, LOAD and XCTL
IGC006(LINK)
IGC007(XCTL)
IGC008(LOAD)
Check Previous RB for SVC8
Yes
No
Search Load List for Program to Be Loaded
Check Previous RB for SVC7
Yes
No
Dequeue and FREEMAIN the XCTL'er
Search Load List for Program to Go to
Search Load List for Program to Go to
Find
Yes
No
BAL to Finch
Find
Yes
No
BAL to Finch
Find
Yes
No
BAL to Finch
Queue up RB on Load List
ECHE the Use Count in the RB
Place E/P Addr Into R0
Move RB Chain Addr from Active RB to New RB
Store New RB Addr in Active RB Chain Field
SVC3
BLDL Subroutine (Entered via BAL)
Set up DCB, IOB, CCW, etc.
Get First Name in BLDL List
Search Directory for Equal or Hi Key SVC0
I/O Error
Return
Scan Block
Get Next Name in BLDL List
Last Name in List Finished
No
Yes
Return
Find Name
Yes
No
Move TTR and User Data to BLDL List
BLDL and FIND
GETMAIN for Work Area
BLDL Requested
No
Yes
Set Return Reg to Point to FREEMAIN
Branch to BLDL Subroutine
BAL to BLDL Subroutine
BLDL Error
Yes
No
BAL to Point Routine
FREEMAIN Work Area
SVC3

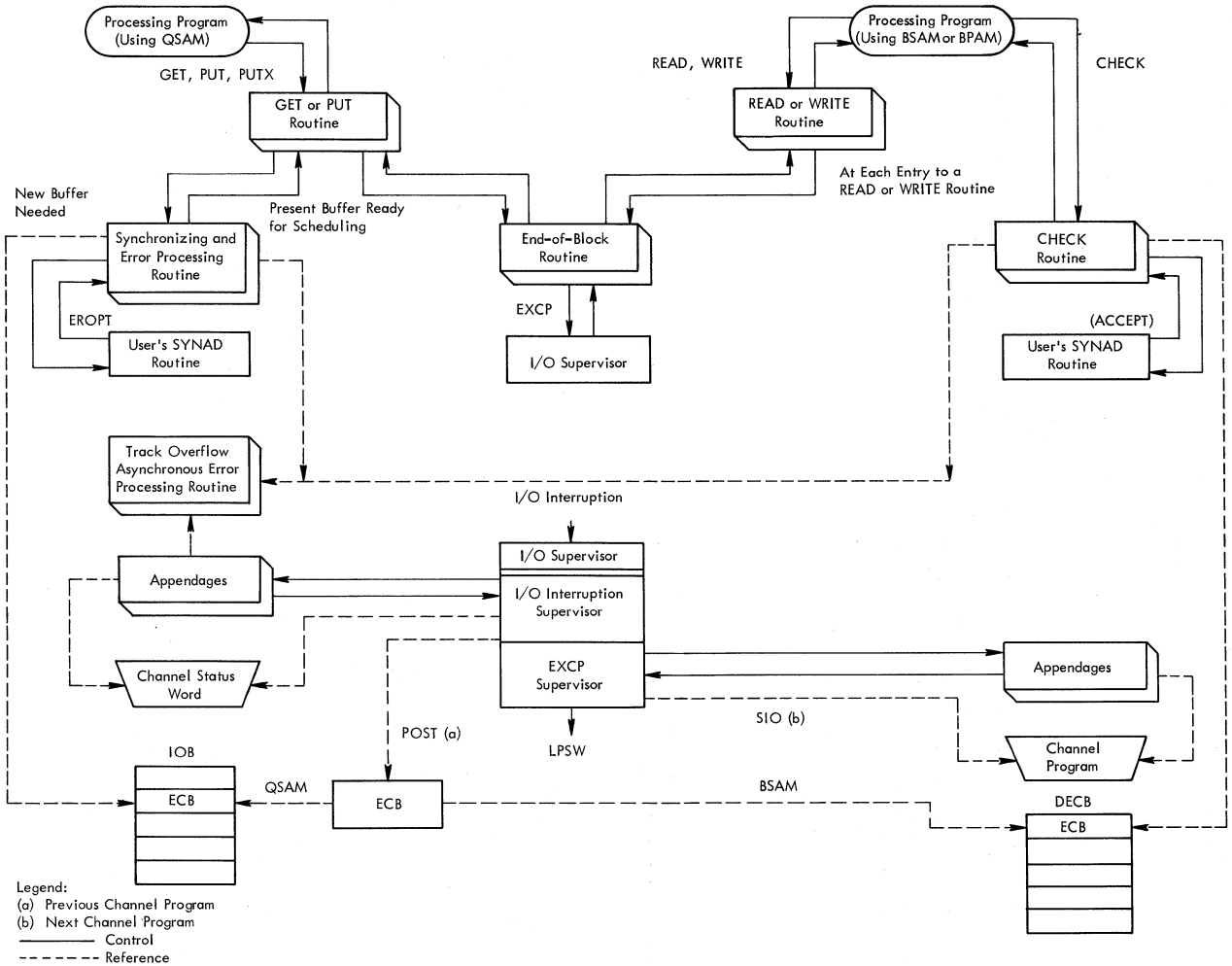
OVERALL CONTROL FLOW OF SUPERVISOR



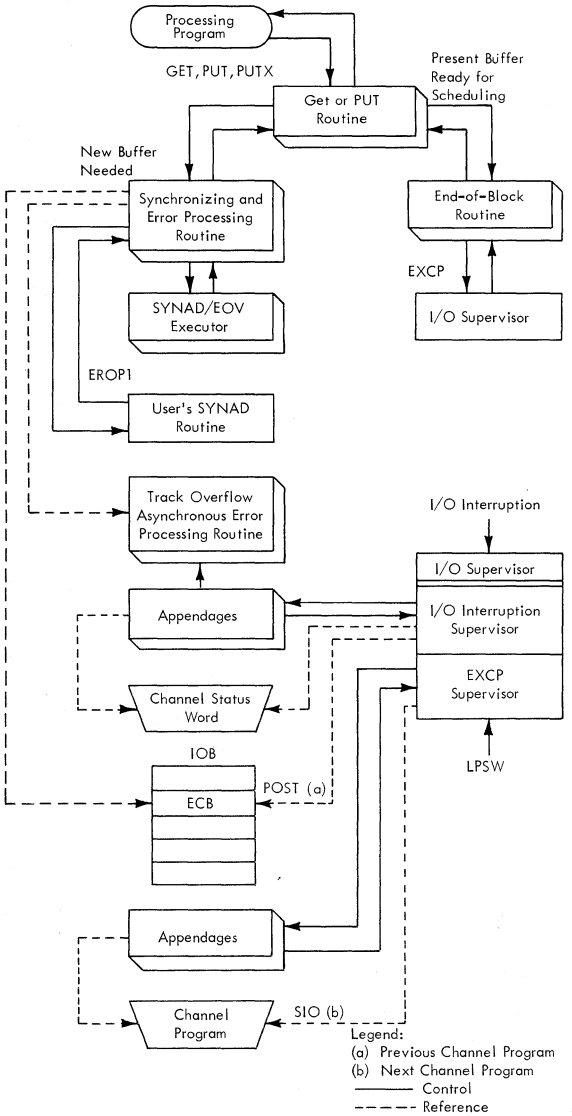



Loc 16 (10)
CVT
CVT
TCB Words
0
TCB
New TCB
Words
Current TCB
0
4
TCB
Newest RB
0
DEB Queue
8
TIOT
12 (C)
Load List
36 (24)
DEB Queue
DEB
Next DEB
DEB
Next DEB
DEB
TCB
Next DEB
DCB
UCB
0
4
24 (18)
32 (20)
Active RB Queue
RB
RB
RB
Module Name
Resume PSW
Previous RB
RB
0
16 (10)
28 (1C)
Load List
RB
Next RB
RB
Next RB
Previous RB
RB
TCB
Previous RB
Prefix
-8
0
Resume PSW
16 (10)
TIOT
jobname
stepname
ddname
UCB
0
8
28 (1C)
40 (28)
Repeated for each device
Repeat for each ddname
UCB
Unit Name
12 (C)
DCB
Direct-Access Address
TIOT Offset
DEB
IOB Prefix
0
4
8
12 (C)
40 (28)
44 (2D)
68 (44)
IOB
IOB
Next IOB
IOB
Next IOB
ECB
Sense Bytes
CC
CSW
CCW
DCB
Prefix
-8
-4
0
4
8
12 (C)
16 (10)
20 (14)
CCW
Code
Data
Flags
Count
0
4
6

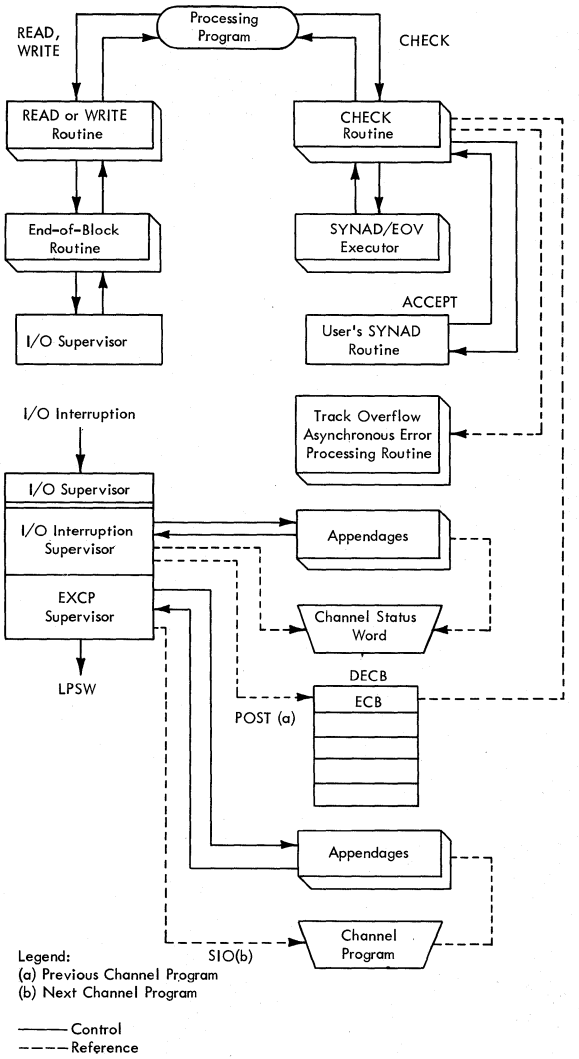
FLOW OF CONTROL IN QSAM, BSAM, AND IN BPAM FOR MEMBERS

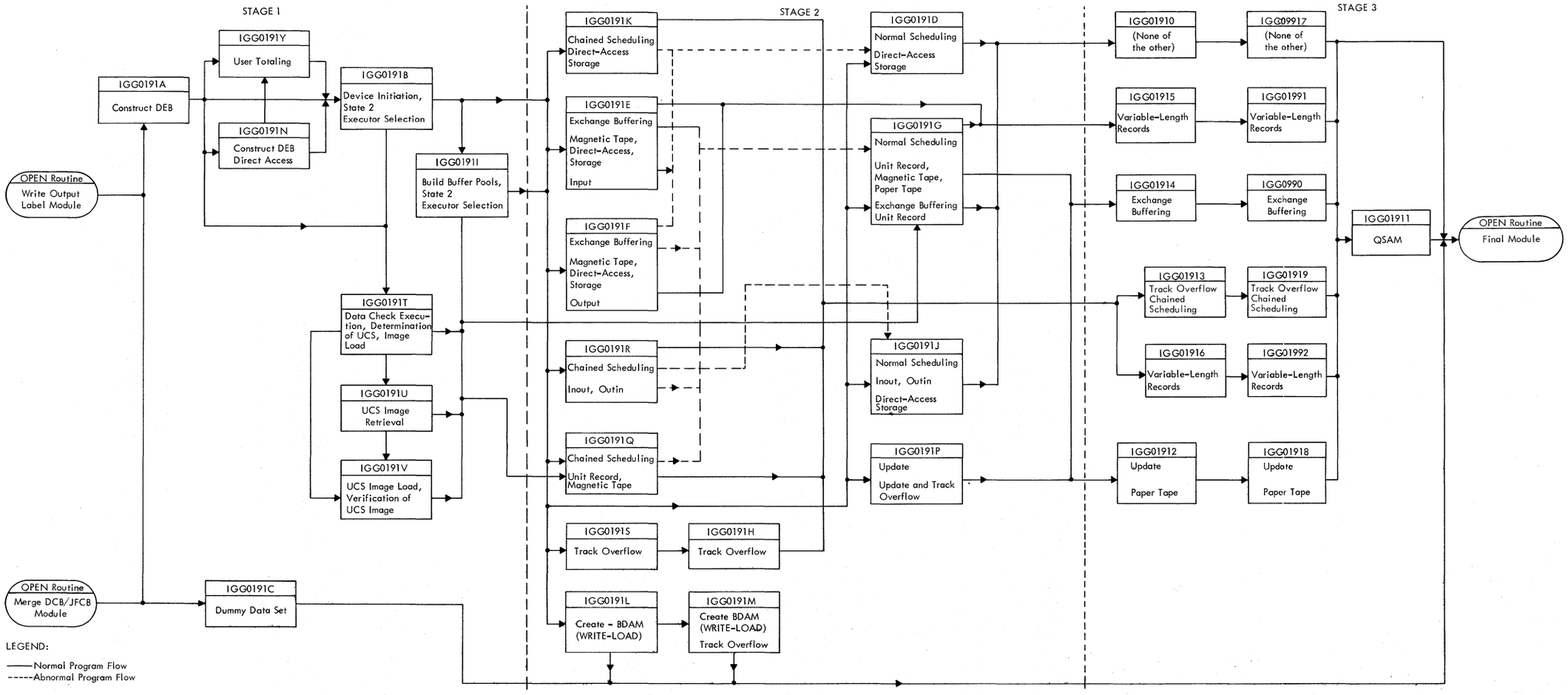


FLOW OF CONTROL IN QSAM



FLOW OF CONTROL IN BSAM




STAGE 1
STAGE 2
STAGE 3
OPEN Routine
Write Output Label Module
IGG0191A
Construct DEB
IGG0191Y
User Totaling
IGG0191N
Construct DEB Direct Access
IGG0191B
Device Initiation, State 2 Executor Selection
IGG01911
Build Buffer Pools, State 2 Executor Selection
IGG0191T
Data Check Execution, Determination of UCS, Image Load
IGG0191U
UCS Image Retrieval
IGG0191V
UCS Image Load, Verification of UCS Image
OPEN Routine
Merge DCB/JFCB Module
IGG0191C
Dummy Data Set
IGG0191K
Chained Scheduling Direct-Access Storage
IGG0191E
Exchange Buffering
Magnetic Tape, Direct-Access, Storage
Input
IGG0191F
Exchange Buffering
Magnetic Tape, Direct-Access, Storage
Output
IGG0191R
Chained Scheduling
Inout, Outin
IGG0191Q
Chained Scheduling
Unit Record, Magnetic Tape
IGG0191S
Track Overflow
IGG0191H
Track Overflow
IGG0191L
Create - BDAM (WRITE-LOAD)
IGG0191M
Create BDAM (WRITE-LOAD)
Track Overflow
IGG0191D
Normal Scheduling
Direct-Access Storage
IGG0191G
Normal Scheduling
Unit Record, Magnetic Tape, Paper Tape
Exchange Buffering
Unit Record
IGG0191J
Normal Scheduling
Inout, Outin
Direct-Access Storage
IGG0191P
Update
Update and Track Overflow
IGG01910
(None of the other)
IGG01915
Variable-Length Records
IGG01914
Exchange Buffering
IGG01913
Track Overflow Chained Scheduling
IGG01916
Variable-Length Records
IGG01912
Update
Paper Tape
IGG09917
(None of the other)
IGG01991
Variable-Length Records
IGG0990
Exchange Buffering
IGG01919
Track Overflow Chained Scheduling
IGG01992
Variable-Length Records
IGG01918
Update
Paper Tape
IGG01911
QSAM
OPEN Routine
Final Module
LEGEND:
——Normal Program Flow
-----Abnormal Program Flow

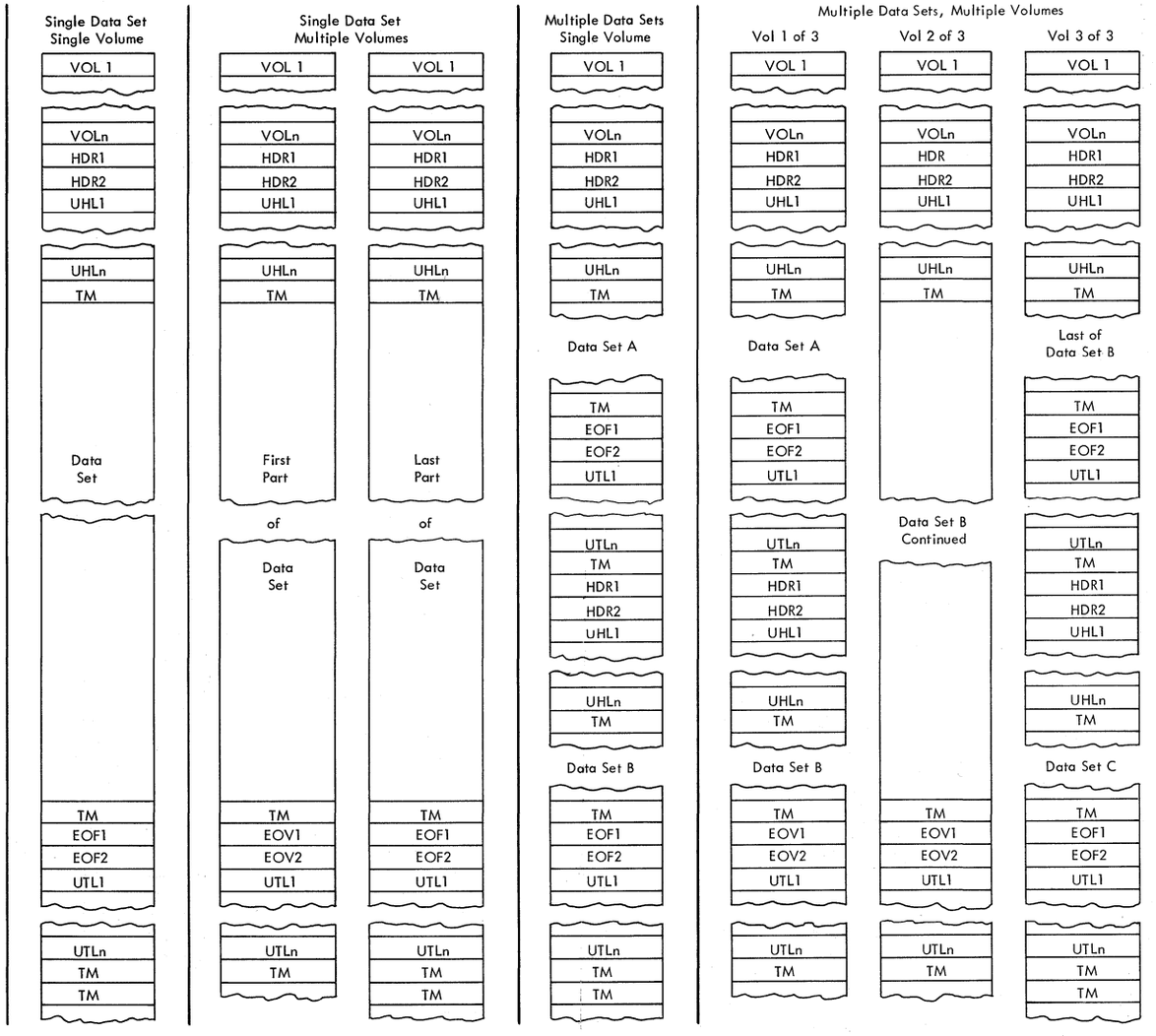
DIRECT ACCESS LABEL TRACK (TRK 0, CYL 0)

H A	R0 Track Descriptor	R1 24 Bytes IPL Record*	R2 144 Bytes IPL2 Record	R3 80 Bytes Volume Label	R4 **

*Non-IPL Volume: PSW X'0006000000000000F'
CCW1 X'0300000000000001'
CCW2 X'0000000000000000'
IPL Volume: PSW X'0000000000000000'
CCW1 X'06003A9860000060'
CCW2 X'08003A9800000000'

**R4 on 2301 or 2314 contains IPL program; otherwise, IPL program (IEAIPL00) is placed on Track 1.

MAGNETIC TAPE



If request is		and data set is		then it can be satisfied with a volume that is:							
				Permanently Resident			Reserved			Removable	
specific	nonspecific	temporary	nontemporary	Public	Private	Storage	Public	Private	Storage	Public	Private
x		x		x	x	x	x	x	x	x	x
x			x	x	x	x	x	x	x	x	x
	x	x		x		x	x		x	x	
	x		x			x			x	(See Note)	
1) Vol=Ser: 2) Vol=Ref to Another DS in Job Step or to the Catalog Old DS Must Always Use Specific Req	No Vol Serial is Stated or Implied Only for New DS	1) No DSNAME 2) &DSNAME 3) Disp=(New, Delete) 4) Add Card That Refers Back to Any of These	1) Old Data Sets 2) Disp Keep or CATLG	These Volumes Are Never Available for Dismounting by the System. 1) Nondismountable (2301, 2302) 2) IPL Vol 3) LINKLIB, PROCLIB or JOBQE Volumes 4) Via PRESRES			Not Available for Dismounting until an Unload CMD Is Issued. 1) Via PRESRES 2) Via a MOUNT CMD			These Volumes Are at the Disposition of the System. 1) All Other DA Volumes	

Note: This type of request is satisfied by a public removable volume that is made private.

ALLOCATION CHARACTERISTICS

A STORAGE volume is:

Designated in PRESRES.
A volume for which the mount command has been given with a USE parameter of STORAGE (i.e., MOUNT 191, USE=STORAGE).

A PRIVATE volume:

Designated in PRESRES.
Requested with the PRIVATE subparameter specified, and the volume is removable.
Was requested nonspecifically for a nontemporary data set and the request had to be satisfied with a removable volume.
A volume for which the mount command has been given with a USE parameter of PRIVATE (i.e., MOUNT 191, USE=PRIVATE).

A PUBLIC volume is:

Designated in PRESRES.
A removable volume that has not been made PRIVATE.
A volume for which the mount command has been issued with a USE parameter of PUBLIC (i.e., MOUNT 191, USE=PUBLIC).

OPERATING SYSTEM/360 COMPONENTS

Program Identification	Program Name	Microfiche Group Code	Common Module Prefix
360S-AL-531	ALGOL F	1025	IEX
360S-AS-036	Assembler E	1030	IET
360S-AS-037	Assembler F	1035	IEU
360S-CB-524	COBOL F	1045	IEQ
360S-CB-545	USAS COBOL	1042	IKF
360S-CI-505*	Primary Control Program:	1010	
	Supervisor, I/O Supervisor, NIP		IEA
	I/O Supervisor		IEC
	Master Scheduler		IEE
	Job Scheduler		IEF
	Transient SVC Routines		IGC
	I/O Error Routines		IGE
	Checkpoint/Restart		IHJ
360S-CI-514	Starter System		
360S-CI-534	Starter System/2314 Resident		
360S-CI-535*	MVT	1012	
360S-CO-503	COBOL E	1040	IEP
360S-CQ-513	BTAM	1016	IGG
360S-CQ-519	QTAM	1017	IGG
360S-DM-508*	Primary Data Management:	1010	IGG
	Access Methods		IGG
	I/O Error		IGE
360S-DM-509	Basic Direct Access Method	1010	IGG
360S-DN-527	SER0, SER1, EREP for Mod 40, 50, 65, 75	1076	IFB
360S-DN-533	OLTEP	1010	IFD
360S-DN-539	Recovery Management, Mod 65	1077	IGF
360S-DN-554	Service Aids		IMA, IMB, IMC, IMD
360S-ED-510	Linkage Editor E	1070	IEW
360S-ED-521	Linkage Editor F	1075	IEW
360S-FO-092	FORTRAN IV E	1050	IEJ
360S-FO-500	FORTRAN IV H	1055	IEK
360S-FO-520	FORTRAN IV G	1052	IEY
360S-IO-523	Graphic Programming Services	1090	IFF
360S-IO-526	ISAM	1010	IGG
360S-LD-547	Loader	1072	IEW
360S-LM-501	FORTRAN E Library	1058	IHC
360S-LM-504	COBOL E Library	1048	IHD
360S-LM-512	PL/I Subroutine Library	1068	IHE
360S-LM-525	COBOL F Library	1045	IHD
360S-LM-532	ALGOL F Library	1025	IHI
360S-LM-537	Graphic Subroutine Program	1090	IKA
360S-LM-542	1130/360 Data Transfer	1094	IKD
360S-LM-546	USAS COBOL Library	1042	ILB
360S-NL-511	PL/I F	1060	IEM
360S-PT-516	TESTRAN	1085	IEG
360S-RC-536	Remote Job Entry	1015	IHK
360S-RC-541	Graphic Job Processor	1090	IKA
360S-RC-543	Satellite Graphic Job Processor	1092	IKD
360S-RG-038	Report Program Generator	1095	IES
360S-SM-023	Sort/Merge	1080	IER
360S-UT-506*	Utilities:	1010	
	Data Set Utilities		IEB
	System Utilities		IEH
	EREP		IFC
	Update Analysis		IHG

Program Identification	Program Name	Microfiche Group Code	Common Module Prefix
360S-UT-507*	Independent Utilities	1010	IBC
360C-CV-710	FORTRAN TO PL/I LCP for OS	4610	IPB
360C-CV-711	ALGOL TO PL/I LCP for OS	4600	IPA
360C-CV-712	COBOL TO PL/I LCP for OS	4620	IPC
360C-CV-713	COBOL TO USA COBOL LCP	9000	IKL
360C-EU-734	7094 Emulator		IIN

*See "OS/360 Subcomponents" for breakdown.

OPERATING SYSTEM/360 SUBCOMPONENTS

OS/360 Control Program Components are divided into the following subcomponents:

CA505/CA535 - Disk Error Routines
CB505/CB535 - Unit Record Error Routines
CC505/CC535 - Tape Error Routines
CD505/CD535 - 1419-1275 Error Routines
CE505/CE535 - 12xx Error Routines
CF505/CF535 - 2495 Error Routines
C2505/C2535 - Supervisor
C3505/C3535 - IOS
C4505/C4535 - Graphics Operator Console Support
C5505/C5535 - Scheduler
C6505/C6535 - Link Edit Overlay Supervisor and Fetch
C7505/C7535 - SYSOUT Writer
C9505/C9535 - SYSGEN

OS/360 Program Component DM508 is divided into the following seven subcomponents:

D1508 - Open/Close/EOV
D2508 - Access Methods
D3508 - Catalog
D4508 - DADSM
D5508 - Optical Readers (12xx)
D6508 - Magnetic Ink Readers (1419-1275)
D7508 - DM Checkpoint/Restart

OS/360 Utilities Component is divided into the following subcomponents:

UA506 - IEBEDIT
UB506 - IEBUPDAT
UC506 - IEBCOMPR
UD506 - IEHIOSUP
UE506 - IHGUAP
UF506 - IEHUCSLD
UG506 - IEBTCRIN
UH506 - IEHATLAS
UJ506 - IEFSTATR
UK506 - IEHDASDR
U1506 - IEHMOVE
U2506 - IEBUPDTE
U3506 - IEBCOPY
U4506 - IEBGENR
U5506 - IEHLIST
U6506 - IEBISAM
U7506 - IEHPROGM
U8506 - IEBPTPCH
U9506 - IEHINITT
U0506 - IEBDG

Independent Utilities Component is divided into the following three subcomponents:

U2507 - IBCDMPRS
U3507 - IBCDASDI
U4507 - IBCRCVRP

ABEND 001-0CX

001 CHECK, GET, PUT: I/O ERR (no SYNAD, EROPT = ABE, or were not specified).
002 WRITE, PUT: Record too large for device or access method; record length greater than BLKSIZE.
008 CHECK: Register 13 incorrect or not pointing to save area.
013 OPEN: DCB incorrect; no member found; no directory allocation.
020 OPEN: A, K, I missing in DCBMACRF.
025 BDAM: DCBSQND outside task.
026 BDAM: DCBXARG incorrect.
030 OPEN: DCBMACRF invalid for ISAM.
031 QISAM: I/O ERR (no SYNAD specified).
032 OPEN: DCBMACRF invalid.
033 OPEN: I/O ERR (reading highest index; EOF incorrect; DCBMSHI not in task).
034 OPEN: DCBSMSI or DCBMSHI invalid.
035 OPEN: DCBMSWA or DCBSMSW invalid.
036 OPEN: No primary allocation; DSCB invalid.
037 OPEN: Inadequate buffers.
038 OPEN: Index area too small; multivolume.
039 SCAN: End of data (no EODAD specified).
03A CLOSE: I/O ERR (attempting to write format 2 DSCB).
03B OPEN: Format 2 DSCB invalid.
03D OPEN: DSORG is not ISAM; volume serial specified is incorrect.
03E OPEN: Format 2 of DSCB indicated invalid operation.
056 GAM: UCB invalid for graphics.
057 GAM: Same as 056.
061 CLOSE: GACB not SPARED in closing task.
062 GAM: INGSP null argument exceeded.
063 GAM: Double cancel by 2250 operator.
090 OPEN: UCB is not TP.
091 OPEN: Unsupported control unit in UCB.
092 OPEN: Unsupported terminal control or unsupported adapter in UCB.
093 OPEN: Unsupported terminal in UCB.
094 OPEN: Unsupported feature or mode in UCB.
095 OPEN: All lines in line group not identical.
096 OPEN: BFTEK = D; no BUFCB; no BUFNO/BUFL.
097 OPEN: I/O directory full.
098 OPEN: UCB does not match options.
0A0 OPEN: DCBTRMAD missing.
0A1 OPEN: DCBSOWA missing.
0A2 OPEN: DDNAME not same as process entry in terminal table.
0A3 QTAM: Message queues data set filled.
0A4 QTAM: I/O ERR in CHKPT (insufficient space; I/O error on format).
0A5 OPEN: DCB opened twice.
0A6 OPEN/CLOSE: OPEN/CLOSE sequence invalid.
0A7 OPEN: I/O ERR in CHKPT (DCB opened early; I/O ERR on restart).
0B0 SCHEDULER: I/O Err (I/O error on SYS1.SYSJOBQE).
0CX PROGCHK: PROG CHK other than 0F1 and 0F2. X = program interrupt code.

X	Interrupt Cause
1	Operation
2	Privileged Operation
3	Execute
4	Protection
5	Addressing
6	Specification
7	Data

X	Interrupt Cause
8	Fixed-Point Overflow
9	Fixed-Point Divide
A	Decimal Overflow
B	Decimal Divide
C	Exponent Overflow
D	Exponent Underflow
E	Significance
F	Floating-Point Divide

0F1 PROGCHK: IOS program check.
0F2 PROGCHK: Type 1 SVC program check.
0F3 MACHCHK: I/O ERR (machine check occurred).
100 EXCP: I/O ERR (device not operational).
101 WAIT: Events exceeded ECB's.
102 POST: Invalid ECB address.
103 EXIT: Invalid ECB; RB address incorrect.
106 LINK/LOAD/ATTACH/XCTL: I/O ERR (reg 15 indicator: 0C = incorrect scatter, 0D = incorrect record type, 0E = incorrect address, 0F = I/O error).
113 OPEN: I/O ERR (JFCB had I/O error; EXLST not specified in Type = J).
117 CLOSE: I/O ERR (tape positioning error).
122 NORMAL: Operator issued CANCEL and DUMP.
124 WTL: Text buffer less than 5; reg 1 not fullword boundary.
126 TESTRAN: TESTRAN CSECT modified.
128 EXTRACT: Invalid list.
12A ATTACH: Freeing sharing subpool.
12C CHAP: Invalid TCB address; not subtask.
12D OVLY: SEGTAB entry 3 and 4 incorrect.
130 DEQ: DEQ specified without previous ENQ.
131 TESTRAN: TESTRAN CSECT modified.
137 EOV: I/O ERR (I/O error at EOV).
138 ENQ: Two consecutive ENQ's.
13E DETACH: DETACH specified for nonterminated task.
13F CHKPT: I/O ERR (failed in RESTART).
140 RDJFCB: I/O ERR (attempting to read JFCB).
155 SWAP: User issued SVC X'55'.
201 WAIT: ECB address invalid.
202 POST: Invalid RB address.
207 XCTL: Used XCTL instead of RETURN.
20A MSS: Storage error (MSS found storage allocated to task when working with region).
213 OPEN: I/O ERR (DSCB could not be read or was not present).
214 CLOSE: I/O ERR (I/O error on tape).
217 CLOSE: I/O ERR (BTAM close; I/O error on JFCB).
222 NORMAL: Operator issued CANCEL.
228 EXTRACT: Invalid list.
22A ATTACH: Subpool number greater than 127 was specified.
22C CHAP: Invalid TCB address.
22D OVLY: Invalid address in SEGTAB or ENTAB.
230 DEQ: Invalid name length.
237 EOV: Label verification error.
238 ENQ: Invalid name length.
23E DETACH: Invalid TCB address.
240 RDJFCB: Incorrect parameter list or exit list.
2F3 RESTART: ERR* (system failure on job).
2FD ROLL: ERR* (unsuccessful ROLLOUT).
2FE ROLL: ERR* (unsuccessful ROLLIN).
2FF NORMAL: Request for ABEND.
301 WAIT: Another wait for this ECB.
305 FREEMAIN: Storage not in subpool.
308 LOAD: Identify macro used in a nonidentify system.
30A FREEMAIN: Storage not in subpool.
313 OPEN: I/O ERR (error in reading format 3 DSCB).
314 CLOSE: I/O ERR (error in reading DSCB).
317 CLOSE: I/O ERR (error in reading DSCB).
322 NORMAL: Time exceeded the time specified.
326 TESTRAN: Number of statements exceeded limit.
328 EXTRACT: TCB specified was not for an immediate subtask.

ABEND 0F1-338 (Continued)

32D OVLY: I/O ERR (reading segment from library).
330 DEQ: RMC specified in problem state.
331 TESTRAN: Incorrect return in TEST OPEN.
337 EOD: EODAD not specified.
338 ENQ: SMC specified in problem state.

ABEND 400-937

400 EXCP: Invalid or nonmatching IOB, DCB, DEB, ECB.
406 LINK: LINK, ATTACH or XCTL specified for only loadable module.
40A FREEMAIN: Attempted to release all of subpool 0.
413 OPEN: I/O ERR (VOL or UNIT missing in the DD specification; DD specification was not met; I/O error during OPEN).
414 CLOSE: I/O ERR (reading or writing DSCB).
417 CLOSE: I/O ERR (writing updated DSCB).
422 SCHED: Insufficient QUEUE space for job.
425 SEGWT: Attempted to load exclusive segment.
426 TESTRAN: Output requested exceeds limit.
42A ATTACH: Invalid ECB.
430 DEQ: Invalid parameter list.
431 TESTRAN: Symbol table and control dictionaries could not be read.
437 EOV: DEBID field not equal to TCBPKF.
438 ENQ: Invalid parameter list.
504 GETMAIN: Invalid list.
505 FREEMAIN: Invalid list.
506 LINK: Insufficient core for TSTRN or OVLY SUPV.
513 OPEN: More than one OPEN issued to same tape unit.
514 CLOSE: I/O ERR (reading JFCB).
522 TIME: All tasks in job step exceeded wait time.
526 TESTRAN: TEST OPEN not issued before TSTRN control.
530 DEQ: Requestor did not issue the ENQ.
531 TESTRAN: No DD specification for TEST OPEN.
537 EOV: Concatenated to nonallocated tape.
604 GETMAIN: Invalid parameters or FQEL.
605 FREEMAIN: See 604.
606 LINK: Available core is insufficient.
60A MSS: R-format FREE/GET with invalid list or FQEL.
613 OPEN: I/O ERR (label missing; tape positioning error).
614 CLOSE: I/O ERR (writing EOF).
626 TESTRAN: MACH CHK* (error occurred while tracing).
637 EOV: I/O ERR (reading label; writing tape mark; tape positioning error).
700 EXCP: I/O ERR (sense command issued).
704 GETMAIN: List mode allowed only in MVT.
705 FREEMAIN: See 704.
706 LINK: Module not executable.
713 OPEN: RETPD not expired and operator replied 'not U'.
714 CLOSE: I/O ERR (while label processing).
717 CLOSE: I/O ERR (Type - T specified while label processing).
737 EOV: I/O ERR (DSCB missing; I/O error).
804 GETMAIN: Insufficient core; requested 0 bytes in PCP or MFT.
806 LINK: I/O ERR (program missing; I/O error).
80A GETMAIN: R-format used (see 804).
813 OPEN: While label is being verified.
826 TESTRAN: Floating-point feature not on CPU.
837 EOV: I/O ERR (while reading or writing JFCB).
904 GETMAIN: For inactive program, FQE is not aligned on doubleword boundary.
905 FREEMAIN: See 904.
906 LINK: Use count exceeded 255.

ABEND 400-937 (Continued)

90A FREEMAIN (R): See 904.
913 OPEN: Password violation.
926 TESTRAN: MACH CHK* (occurred when attempting to return).
937 EOV: I/O ERR (password violation; failure while reading DSCB on second volume).

ABEND A03-FXX

A03 RETURN: Attempted to terminate when subtasks not completed.
A04 GETMAIN: Inactive program overlaps free area.
A05 FREEMAIN: Attempted to overlap free areas.
A06 LINK: Previous request for load module exists.
A0A REGMAIN: See A04, A05.
A13 OPEN: I/O ERR (hit load point while positioning tape).
A14 CLOSE: I/O ERR (In release of unused direct-access space).
A26 TESTRAN: Invalid return address.
B04 GETMAIN: Subpool number greater than 127.
B05 FREEMAIN: See B04.
B06 LINK: I/O ERR (system error task tried to terminate, terminated user instead).
B0A REGMAIN: See B04, B05.
B13 OPEN: I/O ERR (UCS print image not read or loaded in reg 15).
B14 CLOSE: I/O ERR (error during STOW).
B37 EOV: No space available, unable to dismount.
C03 RETURN: Tried to terminate, unable to close DCB's.
C04 GETMAIN: Invalid hierarchy.
C06 LINK: I/O ERR XCTL (see B06).
C13 OPEN: I/O ERR (JFCB, label, Format 3, Format 1 nonreadable on concatenated D/S, GRAPHICS DCB attempted OPEN twice).
D03 RETURN: Attempted return still enqueued.
D05 FREEMAIN: Attempted to free SYSQUEUE space outside task.
D0A REGMAIN: See D05.
D13 OPEN: DCB not specified as graphics.
D14 CLOSE: Graphics DCB opened by other task.
D23 WTO: List, not word boundary.
D2D OVLY: Invalid record type in segment.
D37 EOV: No secondary quantity.
E04 GETMAIN: SQA space not available.
E13 OPEN: DCBGNCP invalid.
E23 WTOR: Reply ECB address invalid.
E2D OVLY: Invalid address in segment.
E37 EOV: PDS out of space; insufficient volumes.
FXX SUPVR: No XX SVC in system.

Notes:

1. I/O error implies, but does not always define, the cause of ABEND as being a true I/O error.

2. All other ABEND codes imply, but do not always define, the cause of ABEND as a specification, parameter violation, etc.

*Specification and I/O errors do not apply.

WAIT STATE CODES

001 IPL/NIP: Not operational on SYSRES (reg 10 = UNIT; if NIP, fourth byte in PSW = FF).
002 IPL/NIP: I/O did not start, CSW valid (reg 10 = UNIT; if NIP, fourth byte in PSW = FF).
003 IPL/NIP: I/O not initiated, CSW invalid (reg 10 = UNIT; if NIP, fourth byte in PSW = FF).
004 IPL/NIP: I/O not initiated, CSW invalid (reg 10 = UNIT; if NIP, fourth byte in PSW = FF).
005 IPL/NIP: Unit check (if IPL, fourth byte in PSW = 00; 4C = addr of CCW; reg 10 = UNIT).
006 IPL/NIP: INTF CNTL, CHNL CNTL, CHNL DATA, CHNL CHAIN, or program check occurred (if NIP, fourth byte in PSW = FF).
007 NIP: Console not available.
008 NIP: Record not found (reg 10 = UNIT).
009 NIP: File mask violated (reg 10 = UNIT).
00F IPL: Cannot find IPL program.
010 NIP: End of cylinder (reg 10 = UNIT).
011 NIP: Track condition check occurred (reg 10 = UNIT).
012 NIP: Prefix switches both same.
013 NIP: Partition switches not in same position; direct access went RDY to NOT RDY or vice versa.
014 NIP: Storage error did not cause machine check.
015 NIP: Storage box enable switches not same.
016 NIP: Upper 4k bytes of storage bad.
017 IPL/NIP: Unit check during sense (reg 10 = UNIT; if NIP, fourth byte in PSW = FF).
018 IPL: Nucleus too big.
019 IPL: Program interrupt, machine check.
020 NIP: IEAMP650 could not be found or I/O error occurred while trying.
021 NIP: I/O error on console (reg 1 = IOB).
0E2 SUPVR: Machine check or channel check and SER0 or SER1 not in system. Run SEREP.
A01 MCH: IGF003W/S, MCH had machine check during error recovery. If S-type message, run SEREP.
A02 MCH: RMS/85 had machine check.
A03 MCH: IGF004W/S, MCH had program check. If S-type message, run SEREP.
A04 MCH: IGF006W/S, MCH could not load transient. If S-type message, run SEREP.
A05 MCH: IGF002W, nonretryable, recoverable failure within SUPVR.
A06 MCH: IGF001W, nonrecoverable failure in SUPVR.
A07 MCH: IGF006W/S, CC does not equal 0 from SYSRES.
A08 MCH: Same as A07, but on TIO.
A09 MCH: IGF006W/S, CC does not equal 1 while attempting to clear with TIO.
A0A CCH: IGF013W/S, inboard record built, but CCH not able to complete or was not present.
A0B MCH: IGF012W/S, machine check during CCH processing.
A0D MCH: IGF0105, machine not Mod 65 or 85.
A0E MCH: IGF0115, MCH not properly initialized by NIP.
A10 MCH: IGF006W/S, I/O ERR during MCH in IGFASR0A.
A12 MCH: IGF006W/S, I/O ERR during MCH in IGFASR1A.
A13 MCH: IGF014I/S, I/O ERR during MCH.
A14 MCH: IGF015I/W/S, I/O ERR during MCH.
A15 MCH: Machine check occurred while saving system environment.
A21 MCH: Both CPU's had MACH CHKS simultaneously.
A22 MCH: MCH failed to complete recovery processing before time-out on second CPU.
E00 CONSOLE: I/O ERR on console.
E02 CONSOLE: I/O ERR on 2250 console.

E04 GETMAIN: SQA had less than 144 bytes.
F02 I/O: IOS detected system error.
F05 SER: Unrecoverable error has been recorded.
F06 SER: Machine check occurred while writing SER record.
F07 SER: Machine checks occurring while trying to write SER record.
F08 SER: SER0 unable to write record; I/O ERR.
F09 SER: Unable to write SER record because of header record error or insufficient space.
F0A SER: Unable to load nonresident module of SER0.
F0D SER1: I/O ERR while trying to write SER record or CPU error.

Comments:

SVC		Description		Register Contents		Module Name*
Dec	Hex	Macro/SVC	Type	Reg 0	Reg 1	MFT/MVT
0	0	EXCP	1		↑IOB	A - IEAAIH00/ A - IEAQFX00
1	1	WAIT	1	Event Count	↑ECB	A - IEAPWT00/ L - IEAQSY50
2	2	POST	1	Comp Code	↑ECB	A - IEAAPT00/ L - IEAQSY50
3	3	EXIT	1			A - IEAAPT00/ L - IEAQSY50
4	4	GETMAIN	1		↑Parm List	A - IEAAMS00/ A - IEAQGM00
5	5	FREEMAIN	1		↑Parm List	A - IEAAMS00/ A - IEAQGM00
6	6	LINK	2		↑Parm List	A - IEAATC00/ L - IEAQLK00
7	7	XCTL	2		↑Parm List	A - IEAATC00/ L - IEAQLK00
8	8	LOAD	2	↑(↑Entry Point)	↑DCB	A - IEAATC00/ L - IEAQLK00
9	9	DELETE	1	↑Program Name		L - IEAHDL00/ L - IEAQLK00
10	A	REGMAIN	1	Subpool No. (0), Length (1-3)	↑Area to be Freed	A - IEAAMS00/ L - IEAQGM00
11	B	TIME	1		Time Units Code	L - IEA0RT00/ L - IEAQRT00 (Note 1)
12	C	SYNCH	2	Reg 15 Contents	Branch Addr	L - IEAASY00/ L - IEAQLK00
13	D	ABEND	4		Comp Code	L - IEAGAB00/ L - IEAQAB00
14	E	SPIE	3		↑PICA	L - IEAAPX00/ L - IEAQTB00
15	F	ERREXCP	1		↑RQE	A - IEAA1H00/ A - IEAQFX00
16	10	PURGE	3		↑Parm List	L - IECIPR12/ L - IECIPR16
17	11	RESTORE	3		↑IOB Chain	L - IGC0001G
18	12	BLDL	2	↑Build List	↑DCB	A - IGC018/ L - IECPFND1
19	13	OPEN	4		↑Parm List	L - IGC00011
20	14	CLOSE	4		↑Parm List	L - IGC00020
21	15	STOW	3	↑Parm List	↑DCB	L - IGC0002A
22	16	OPEN TYPE = J	4		↑Parm List	L - IGC0002B
23	17	CLOSE TYPE = J	4		↑Parm List	L - IGC0002C
24	18	DEVTYPE	3		↑DD NAME	L - IGC0002D
25	19	TRKBAL	3		↑DCB	L - IGC0002E
26	1A	CATALOG	4		↑Parm List	L - IGC0002F
27	1B	OBTAIN	3		↑Parm List	L - IGC0002G
28	1C	CVOL	4		↑DCB or UCB	L - IGC0002H
29	1D	SCRATCH	4	↑UCB	↑Parm List	L - IGC0002I

* A = assembled module name.
L = microfiche module name and implies that it has been Link Edited or moved into system.

SVC		Description		Register Contents		Module Name*
Dec	Hex	Macro/SVC	Type	Reg 0	Reg 1	MFT/MVT
30	1E	RENAME	4	†UCB	†Parm List	L – IGC00030
31	1F	FEOV	4		†DCB	L – IGC0003A
32	20	ALLOC	4		†UCB List	L – IGC0003B
33	21	IOHALT	3		†UCB	L – IGC0003C
34	22	MGCR	4	Indicator	Indicator	L – IEE0303D
35	23	WTO	4		†Message	L – IEECVWTO
36	24	WTL	4		†Message	L – IEE0303F
37	25	SEGLD	2	IF = 0 SEGLD	†SEG-NAME	L – IEWSVOVR/ L – IEWSUOVR L – IGC038
38	26	TTROUTER	2			
39	27	LABEL	3		†Parm List	L – IGC0003I
40	28	EXTRACT	1		†Parm List	L – IEAAXR00/ L – IEAQTR00
41	29	IDENTIFY	3	†Entry Point	†Entry Point	L – IEAAID00/ L – IEAQTD00
42	2A	ATTACH	2		†Parm List	L – IEAAAT00/ L – IEAQAT00 (Note 2)
43	2B	CIRB	2	†Entry Point	Work Area Size, IF NEG DIRB	L – IEAAEF00
44	2C	CHAP	1	Priority	†TCB	NOP/ L – IEAQTB00 (Note 3)
45	2D	OVLYBRCH	2		Reg 15 = Entry Point	L – IEWSVOVR/ L – IEWSUOVR
46	2E	TTIMER	1		1 : CANCEL	L – IEA0ST00/ L – IEAQST00
47	2F	STIMER	2	†Exit	†Timer Interval	L – IE0ST00/ L – IEAQST00
48	30	DEQ	1		† QCB	L – IEAGENQ2/ L – IEAQENQ2
49	31	TTOPEN	3			A – IGC00041
50	32	NOP	–			N/A
51	33	SNAP	4		† Parm List	L – IEAAAD00/ L – IEAQAD00
52	34	RESTART	4		† DCB	L – IEFVSMBR
53	35	RELEX	3	†KEY	† DCB	L – IGC0005C
54	36	DISABLE	2		† DECB	L – IGC054
55	37	EOV	4	†IOB	† DCB	L – IGC0005E
56	38	ENQ	1	† QEL	† QCB	L – IEAGENQ2/ L – IEAQENQ2
57	39	FREEDBUF	3	†DECB	† DCB	L – IGC0005G
58	3A	RELBUF	1		† DCB	L – IGC058
59	3B	OLTEP	3	† Parm List	Code	L – IGC0005I
60	3C	STAE	3	Flag	† Parm List	L – IEAAST00
61	3D	TTSAV	3		† Parm List	L – IGC0006A
62	3E	DETACH	1		†TCB	L – IEAGED02/ L – IEAQED02
63	3F	CHKPT	4		† DCB	L – IHJACP00
64	40	RDJFCB	3		† Parm List	L – IGC0006D
65	41	QWAIT	2		† Parm List	L – IECKQQ01
66	42	BTAM TEST	4		† IOB	L – IGC0006E
67	43	QPOST	2		† RECV	L – IECKQQ01
68	44	SYNADEF	4	Return Code	† Buffer	L – IGC0006H
69	45	BSP	3		† DCB	L – IGC0006I

SVC		Description		Register Contents		Module Name*
Dec	Hex	Macro/SVC	Type	Reg 0	Reg 1	MFT/MVT
70	46	GSERV	2		↑Parm List	L – IGC070
71	47	BUFSERVICE	3		↑Parm List	L – IGC0007A
72	48	CHATR	4		↑Parm List	L – IEECMCTR
73	49	SPAR	3		↑Parm List	L – IGC0007C
74	4A	DAR	3		↑Parm List	L – IGC0007D
75	4B	DQUEUE	3		↑Parm List	L – IGC0007E
76	4C	IFBSTAT	3			L – IFBSTAT
77	4D	QTAM TEST	4		↑Parm List	L – IGC0007G
78	4E	DISP SPACE	3	↑UCB	↑MSG Area	L – IGC0007H
79	4F	STATUS	1	Mask (0 – 1), Type (2 – 3)	↑TCB	L – IEAQSETS
80	50	IKASVC	3	↑Parm List	CCT	L – IKASVC
81	51	SETPRT	4		↑Parm List	L – IGC0008A
82	52	DASDR	4		↑Parm List	L – IGC0008B
83	53	SMFWTM	3		↑Message	L – IEESMF8C
84	54	GRAPHICS	1	↑UCB		L – IGC084
85	55	SWAP				L – IGC0008E
86	56	ATLAS	4		↑Parm List	L – IGC0008F
87	57	DOM	3	IFZERO IFNEG	MSG ID ↑MSG List	L – IEECXDOM
88	58	MOD 88	3	Routing Code	↑DCB	L – IGC0008H
89	59	EMSRV	3		↑Parm List	L – IGC0008I
90	5A	XQMNGR	4	↑ECB/IOB List	↑QMPA	L – IEFXQM00
91	5B	VOLSTAT	3	↑DCB	0 = Close Issued 0 ≠ EOV Issued	L – IGC0009A

Notes:

1. With no hardware timer, all systems L – IEA0RT10
2. MFT with subtasking, A – IEAQAT00
3. MFT with subtasking, L – IEAQCH00

Comments:

SYSTEM/360 OPERATING SYSTEM REGISTER USAGE

General Register	Supervisor	IOS	Open/ Close/EOV	Fetch, Link, XCTL Load
0		@ TCB	Work/Par	
1		@ RQE	Work/Par	
2		@ IOB	@ DCB	@ Linkor's RB
3	@ CVT	@ DEB	Base	@ CVT
4	@ TCB	@ DCB	@ Work Area	@ TCB
5	@ RB	Base	@ Par List	@ SVRB
6	@ SVC	Unit Addr	@ WTG	@ Work
7		@ UCB	@ Curr Par	Base
8		Link	@ Curr WTG	Return
9		Char	@ TIOT	Branch
10		Work	@ UCB	@ Linkee's RB
11		Work		@ Work
12		Work/Link		@ Linkee's Name
13		Log Ch Wd		
14	@ T1 Exit	Link		
15		Appn Base		

Symbol	Save Sequence	User
IORGSAV	2-9	IO FLIH
PDSAV	10-1	IO FLIH and Ext FLIH
PISAV	10-9	PC FLIH
SVCSAV	0-15	SVC FLIH
IEAEXSAV	2-9	EXT FLIH

HOW TO FIND

IORGSAV: Location 7D (address portion of I/O new PSW) contains the address of I/O FLIH. The two-byte ADCON of IORGSAV is located 10 bytes from the entry point.

PISAV: IORGSAV + 20(hex).

PDSAV: PDSAV is IORGSAV + 60(hex) bytes.

IEAEXSAV: IORGSAV.

SVCSAV: Location hex 65 (the address portion of SVC new PSW) contains the address of SVC FLIH. The two-byte ADCON for SVCSAV is located two bytes from the entry.

Comments:

SYSTEM ENQ/DEQ NAMES

Major	Minor	Use
SYSDSN	dsname	Used by scheduler for each non-temporary DSNAME specified in the DD statements of a job.
SYSIEECT	IEEWQE	Used by scheduler when all console buffers are full.
SYSIEECT	IEERQE	Used by scheduler when the number of outstanding reply requests is at the system limit.
SYSIEFSD	Q1	Used by queue manager during processing of ENQ/DEQ to protect queue control records (QCR's).
SYSIEFSD	Q2	Used by the queue manager during processing of assign and delete to protect QCR's.
SYSIEFSD	Q3	Used by queue manager during processing of 'no space in job queue' condition.
SYSIEFSD	Q4	Used by device allocation while using resident unit control blocks (UCB's).
SYSIEFSD	Q5	Used by device allocation, job and step termination, and SYSOUT writer while using UCB's.
SYSIEFSD	Q6	Used by initiator while processing pending STOPINIT commands.
SYSIEFSD	Q7	Used by master scheduler to permit cancelling of a system output writer during device allocation.
	CPOWAIT	Used by writer when deleting output Q entries.
	SP	Used to ENQUE on a small partition.
SYSIEA01	IEA	Used by ABEND 5 to obtain exclusive use of the dump data set.
SYSIEA0A	IEA	Used by ABEND and SNAP to gain access to a dump data set.
SYSVTOC	X'C0'	Used by DADSM to provide VTOC integrity.
	ucbptr BB (6 bytes)	(BB is for bin number 2321.)
SYSPSWRD	PASSWORD	Used by OPEN/EOV to assure serial update to the security data set.

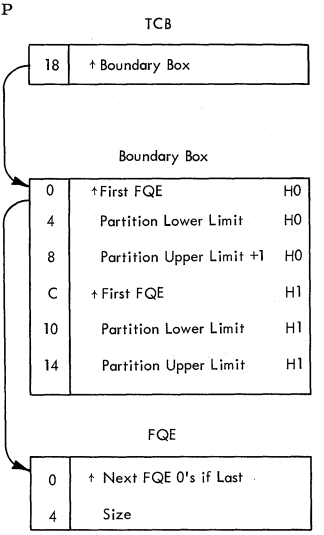
SYSDSNbb	SYSCTLG	Used by CATALOG for system catalog integrity.
SYSIGGLG	ucbptr-BCCHHR (8 bytes)	Used by BDAM for read/write exclusive.
SYSIEFAR	WD	Used by the accounting data set writer (Module IEFWAD). See Systems Reference Library, IBM System/360 Operating System, System Programmer's Guide, GC28-6550.
SYSJMPCH	BATRM	Used by INIT to gain access to GCB chain.
SYSIEWL	(Dsname for SYSLMOD)	Used by linkage editor.
SYSCTLG	SYSCTLG	Used by catalog management to ensure catalog integrity.
SYSIEC16	F0	Used by SVC 16 (PURGE) to get exclusive use of caller's DEB chain.
SYSIGGLG	R0	Used by BDAM to get exclusive control of R0 (capacity record).

MODULES USING ENQ/DEQ

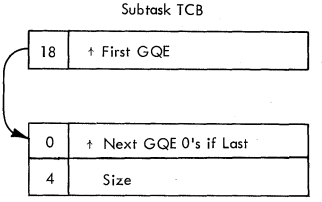
Module Name	Enq Minor
IEESD562	Q1
IEESD563	Q1
IEESD564	Q1
IEESD565	Q1
IEEVACTL	Q7
IEFQASGQ	Q2 and Q3
IEFQDELQ	Q2
IEFQMDQQ	Q1
IEFQMNQQ	Q1
IEFSD079	CPO WAIT
IEFSD160	Q2 and BATRM
IEFSD161	Q2 and Q6 and BATRM
IEFSD166	Q2 and Q6
IEFSD171	Q5
IEFSD21Q	Q4 and Q5
IEFSD22Q	Q5
IEFSD31Q	Q5
IEFSD41Q	Q4 and Q5
IECIPR16	X'F0'
IEAQTM02	IEA
IGG0553E	SYSUTOC

MAIN STORAGE SUPERVISION (DISPLACEMENTS IN HEX)

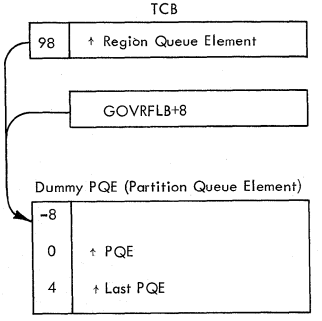
MFT AND PCP



MFT WITH SUBTASK



MVT



PQE (Partition Queue Element)

0	↑FBQE↑PQE if None
4	↑Last FBQE↑PQE if None
8	↑Next PQE 0's if Last
C	↑Previous PQE 0's if First
10	↑TCB 0's if From Unassigned Core
14	Size
18	↑Start of Region

FBQE (Free Block Queue Element)

0	↑Next FBQE↑PQE if Last
4	↑Previous FBQE↑PQE if First
8	Size

TCB

18	↑SPQE

SPQE (Subpool Queue Element)

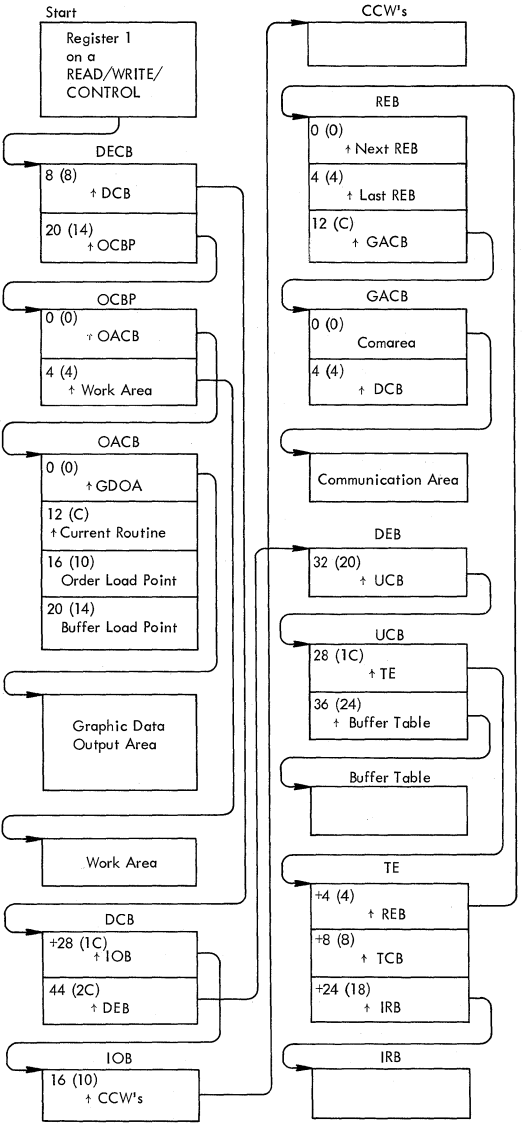
0	↑Next SPQE	
4	SPID	↑DQE

DQE (Descriptor Queue Element)

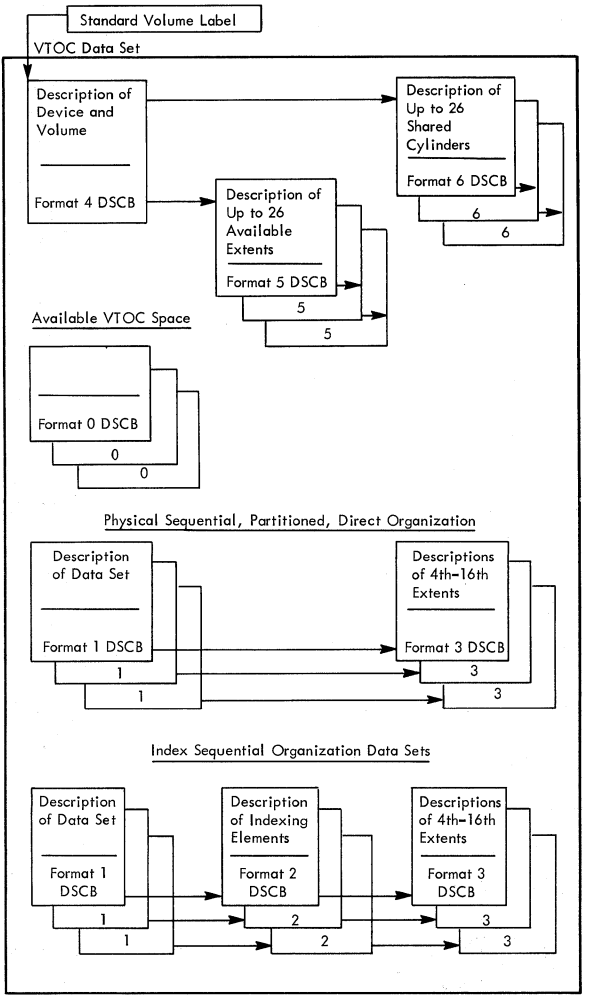
0	↑FQE
4	↑Next DQE 0's if Last
8	Address of Block
C	Size

FQE (Free Queue Element)

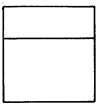
0	↑Next FQE 0's if Last
4	Size


Start
Register 1 on a READ/WRITE/ CONTROL
DECB
8 (8) ↑ DCB
20 (14) ↑ OCBP
OCBP
0 (0) ↑ OACB
4 (4) ↑ Work Area
OACB
0 (0) ↑ GDOA
12 (C) ↑ Current Routine
16 (10) Order Load Point
20 (14) Buffer Load Point
Graphic Data Output Area
Work Area
DCB
+28 (1C) ↑ IOB
44 (2C) ↑ DEB
IOB
16 (10) ↑ CCW's
CCW's
REB
0 (0) ↑ Next REB
4 (4) ↑ Last REB
12 (C) ↑ GACB
GACB
0 (0) Comarea
4 (4) ↑ DCB
Communication Area
DEB
32 (20) ↑ UCB
UCB
28 (1C) ↑ TE
36 (24) ↑ Buffer Table
Buffer Table
TE
+4 (4) ↑ REB
+8 (8) ↑ TCB
+24 (18) ↑ IRB
IRB

VOLUME TABLE OF CONTENTS



Legend: Data Set Control Block



TRACE TABLE

HOW TO USE TRACE TABLE

The tracing routine is a System/360 Operating System optional feature that can be used as a debugging and maintenance aid. The tracing routine and its table can be included in the control program during the system generation process. This is done using the TRACE option in the SUPRVSOR macro-instruction. The format of this option requires supplying the number of entries in the table. Each table entry can contain information relating to one of the traced conditions. When the last entry in the table is filled, the next entry overlays the first.

The tracing routine can be bypassed by placing any value in byte location 20 (14 hex). To resume tracing byte location 20 (14 hex) must be reset to zero. The tracing routine is also bypassed during abnormal termination procedures.

PCP AND MFT TRACE TABLE FORMAT

The tracing routine stores, in a table, information pertaining to the following conditions:

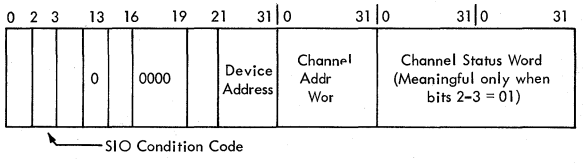
00 = SIO instruction execution
41 = SVC interruption
40 = I/O interruption
4F = Task switch (MFT only)

20 (X'14') is a pointer to three fullwords consisting of:

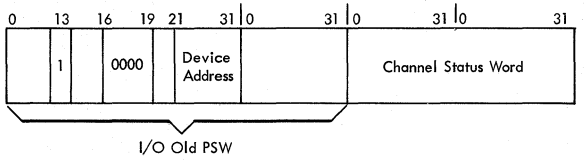
Address of Last Entry	Address of Table Beginning	Address of Table End

Each trace table entry consists of four fullwords.

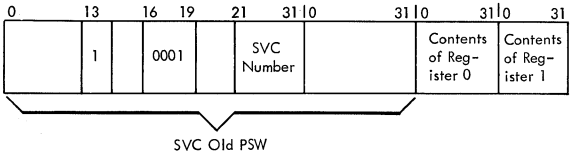
SIO Instruction



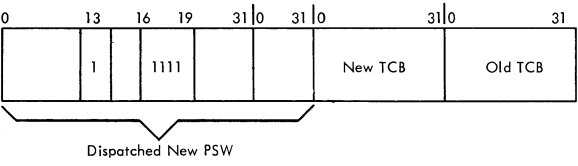
I/O Interruption



SVC Interruption



Task Switch



MVT TRACE TABLE FORMAT

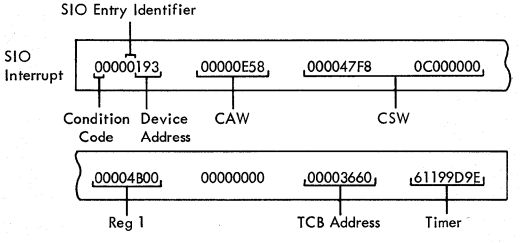
The address of the trace table is contained in a 12-byte field whose address is at hex location 54 and in secondary CVT. The format of the field is:

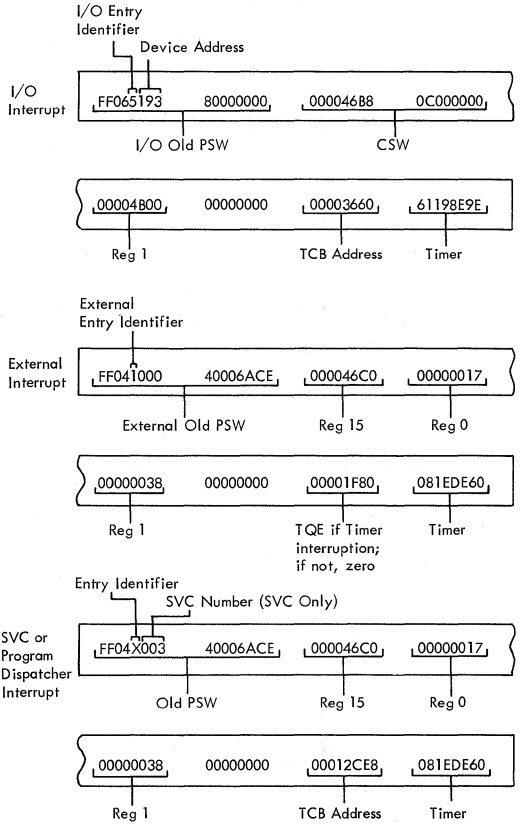
Address of Last Entry	Address of Table Beginning	Address of Table End

The fifth character of each entry determines the type of entry as indicated below.

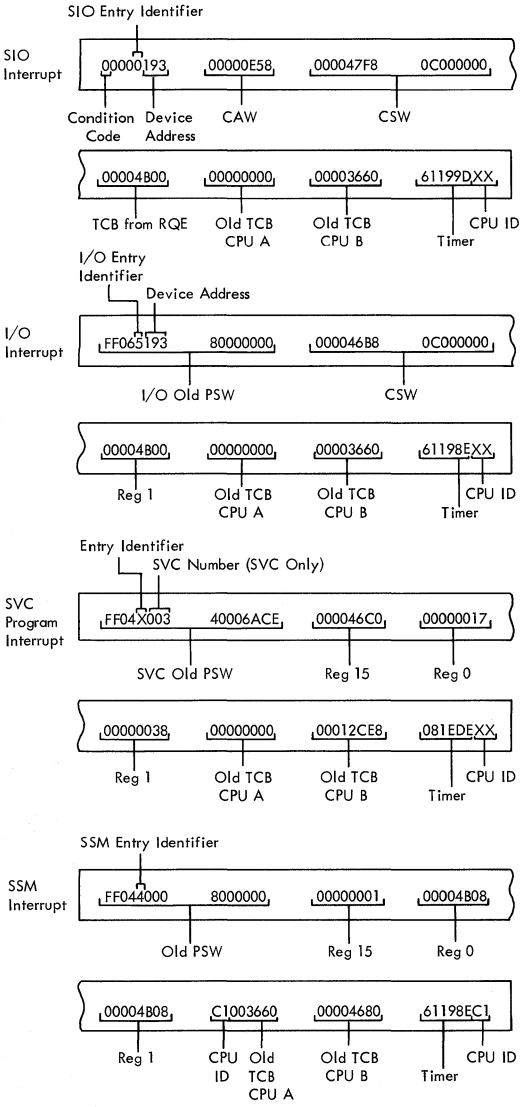
0 = SIO interrupt
1 = External interrupt
2 = SVC interrupt
3 = Program interrupt
4 = SSM program interrupt (MP65)
5 = I/O interrupt
D = Dispatcher interrupt

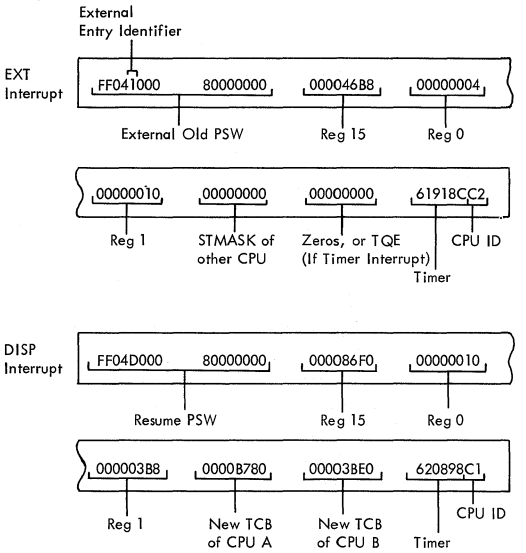
Each trace table entry consists of eight fullwords.




I/O Entry Identifier
Device Address
I/O Interrupt
FF065193
80000000
000046B8
0C000000
I/O Old PSW
CSW
00004B00
00000000
00003660
61198E9E
Reg 1
TCB Address
Timer
External Entry Identifier
External Interrupt
FF041000
40006ACE
000046C0
00000017
External Old PSW
Reg 15
Reg 0
00000038
00000000
00001F80
081EDE60
Reg 1
TQE if Timer interruption; if not, zero
Timer
Entry Identifier
SVC Number (SVC Only)
SVC or Program Dispatcher Interrupt
FF04X003
40006ACE
000046C0
00000017
Old PSW
Reg 15
Reg 0
00000038
00000000
00012CE8
081EDE60
Reg 1
TCB Address
Timer

Comments:


SIO Entry Identifier
SIO Interrupt
00000193
00000E58
000047F8
0C000000
Condition Code
Device Address
CAW
CSW
00004B00
00000000
00003660
61199DXX
TCB from RQE
Old TCB CPU A
Old TCB CPU B
Timer
CPU ID
I/O Entry Identifier
Device Address
I/O Interrupt
FF065193
80000000
000046B8
0C000000
I/O Old PSW
CSW
00004B00
00000000
00003660
61198EXX
Reg 1
Old TCB CPU A
Old TCB CPU B
Timer
CPU ID
Entry Identifier
SVC Number (SVC Only)
SVC Program Interrupt
FF04X003
40006ACE
000046C0
00000017
SVC Old PSW
Reg 15
Reg 0
00000038
00000000
00012CE8
081EDEXX
Reg 1
Old TCB CPU A
Old TCB CPU B
Timer
CPU ID
SSM Entry Identifier
SSM Interrupt
FF044000
8000000
00000001
00004B08
Old PSW
Reg 15
Reg 0
00004B08
C1003660
00004680
61198EC1
Reg 1
CPU ID
Old TCB CPU A
Old TCB CPU B
Timer
CPU ID


External
Entry Identifier
EXT
Interrupt
FF041000
80000000
000046B8
00000004
External Old PSW
Reg 15
Reg 0
00000010
00000000
00000000
61918CC2
Reg 1
STMASK of
other CPU
Zeros, or TQE
(If Timer Interrupt)
CPU ID
Timer
DISP
Interrupt
FF04D000
80000000
000086F0
00000010
Resume PSW
Reg 15
Reg 0
000003B8
0000B780
00003BE0
620898C1
CPU ID
Reg 1
New TCB
of CPU A
New TCB
of CPU B
Timer

Comments:

UCB LOOKUP TABLE

The UCB lookup table is used by the I/O interruption supervisor to obtain the address of the UCB associated with an I/O interruption.

The UCB lookup table has the following characteristics:

1. Creation: The table is created at system generation time.
2. Storage Area: The table resides, as a permanent part of the resident supervisor, in protected resident storage (when protection is available).
3. Size: The size of the table is dependent upon the number and the unit addresses of I/O devices, control units, and physical channels attached to the system.
4. Means of Access: The table values are used in the algorithm routine. (See "Logical Channel Word Table".) The table is addressed by the CVT. The algorithm (shown as follows) is used to obtain the address of the UCB.

IECILK1 + 3-bit channel address ⟶ K
IECILK1 + 4-bit control unit address + K ⟶ L
IECILK2 + 2 (4-bit device address) + 2L ⟶ the actual UCB address
THE ⟶ reads "is the address of."

For a system in which the value of IECILK1 exceeds 255, the L_n field is 2 bytes, and the algorithm is:

IECILK1 + 4-bit channel address ⟶ K
IECILK1 + 2 (4-bit logical control unit address) + K ⟶ L
IECILK2 + 2 (4-bit logical device address) + 2L ⟶ UCB address

IECILK1
is the starting address of the UCB lookup table.

IECILK2
is the starting address of the UCB address list portion of the UCB lookup table.

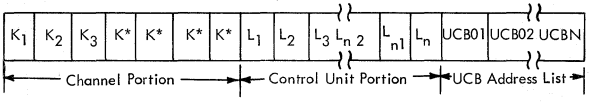
K
is the index value obtained from the channel portion of the UCB lookup table.

L
is the index value obtained from the control unit portion of the UCB lookup table.

Actual UCB address
is the 2-byte address of the UCB associated with the I/O interruption. This address is obtained from the UCB address list portion of the UCB lookup table.

Note: The addresses of both the IECILK1 and the IECILK2 are contained in the CVT.

UCB LOOKUP TABLE FORMAT (SEGMENTED)



K_n (1 byte)
The channel portion contains index values that are relative to the starting address of the entire UCB lookup table.

L_n (1 byte)
The control unit portion contains index values that are relative to the starting address of the UCB address list.

UCB_n (2 bytes)
The UCB address list contains the addresses of the UCB's in the system.

HOW TO FIND SPECIFIC I/O DEVICE UCB

CVT + 36 DEC (24 hex) is pointer to IECILK1.

CVT + 40 DEC (28 hex) is pointer to IECILK2.

Assume IECILK1 is at 1620.

Assume IECILK2 is at 1644.

Assume that the UCB for unit 191 is to be located.

'K' is Channel Index Value.

'L' is Unit Index Value.

IECILK1 + 3 Bit Chan Addr = Addr of K
1620 + 1 = 1621
Location 1621 contains 10

IECILK1 + 4 Bit Unit Addr + K = Addr of L
1620 + 9 +10 = 1639
Location 1639 contains 1F

IECILK2 + 2(Device Addr) + 2(L) = Pointer to Beginning
1644 + 2(1) + 2(1F) = of 191 UCB
1644 + 2 +3E = 1684
Location 1684 contains 1994
(1994 is beginning of UCB for 191).

Comments:

HOW TO FIND ASSOCIATED LOGICAL CHANNEL WORD

CVT PTR (+140) to LCW Table

$$+ 8 \begin{pmatrix} \text{UCB+10} \\ \text{LCH TAB} \end{pmatrix} = \text{LCW}$$

LOGICAL CHANNEL WORD TABLE

The logical channel word table consists of the logical channel words that control the logical channel queues. It is used by the I/O supervisor and the I/O purge and SVC purge routines.

The logical channel word table has the following characteristics:

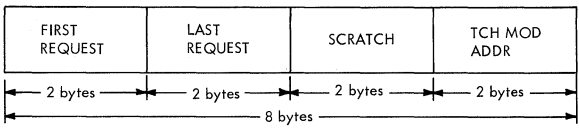
1. Creation: The table is created at system generation time.

2. Storage Area: The table resides, as a permanent part of the resident supervisor, in protected resident storage (when protection is available).

3. Size: The table contains one 8-byte logical channel word per logical channel queue.

4. Means of Access: Find the start of the LCW table in CVT + 8C; add to this pointer the value of the LCHTAB byte in the UCB (UCB + A) multiplied by eight.

The format of a logical channel word is:



FIRST REQUEST (2 bytes)
These two bytes contain either an address or an index value to the first request element in the logical channel queue.

LAST REQUEST (2 bytes)
These two bytes contain either an address or an index value to the last request element in the logical channel queue.

SCRATCH (2 bytes)
This field is used as a temporary storage area for an address or index value. The field is used when more than one logical channel queue for a physical channel is searched in order to find the highest priority I/O request with which to restart the channel.

TCH MOD ADDR (2 bytes)
This field addresses the device-dependent test channel module.

Notes:

1. When a logical channel queue is void, the FIRST REQUEST field contains a dummy link address of hex FFFF and the LAST REQUEST field contains the address of that logical channel word.

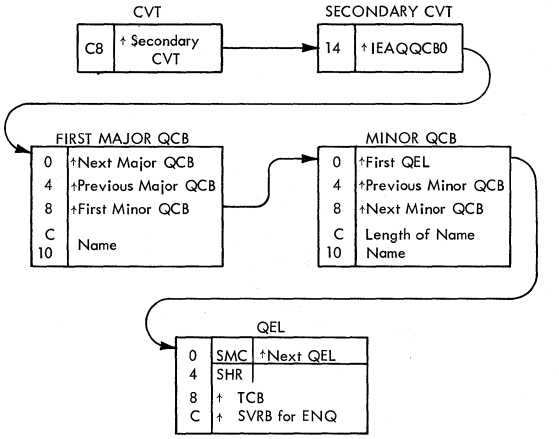
2. When there is only one request element in the queue, both FIRST REQUEST and LAST REQUEST contain the address of that element.

HOW TO FIND QCB's IN MVT

A. Locate CVT + C8 which is the pointer to secondary CVT.

B. Secondary CVT + 14 (hex) is the pointer to IEAQQCB0 which is the first major QCB. IEAQQCB0 is the name for LMODMAP reference.

MVT



HOW TO FIND RESIDENT BUILD LIST -- IECPFNDI

A. Pick up CVT pointer in loc 10 hex.

B. Add 20 hex to this pointer. This is CVTPRLTV pointer.

C. Locate CVTPRLTV entry -4.

D. This is pointer to resident build list.

E. Format of resident build list is:

0-1	No. of entries
2-3	Length of each entry
4-43	Entry #1
44-?	Entry #2, etc.

Normal length of each entry is 40 bytes. See System/360 Operating System Supervisor -- Data Management Instructions, GC28-6647.

HOW TO FIND THE ENTRY POINT OF TYPE I & II SVC's

A. Pick up the instruction address from the SVC New PSW at 60 hex.

B. Starting at the location in Step A, search for the first LM instruction (98 89 0XXX).

C. The pointer to the SVC table is at address XXX (Step B).

D. The pointer to the SVC prefex table is at address XXX+4 (Step B). The pointer to the SVC FLIH is at address XXX+8 (Step B).

E. Add the SVC number (hex) to the address of the SVC prefix table.

F. Pick up the byte value pointed to by the result of Step E.

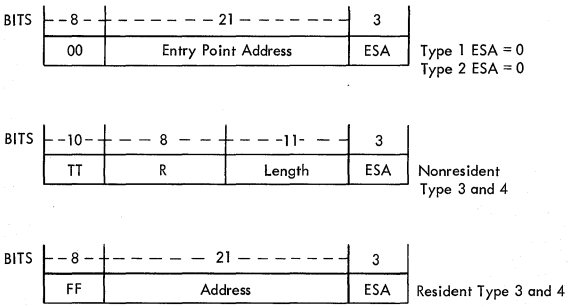
G. Multiply the value picked up in Step F by 4 if TRSVCTBL was specified at SYSGEN, or, if the system is MVT or M65MP; otherwise, multiply by 3.

H. Add the results of Step G to the address of the SVC table (determined in Step C).

I. The value computed in Step H points to a 3-byte address constant which is the SVC routine entry point.

Note that all entry points are on a doubleword boundary. The three low-order bits in the entry address are not part of the actual address. One subtracted from the value of these bits indicates the number of doublewords used in the save area by this SVC routine.

SVC TABLE FORMAT

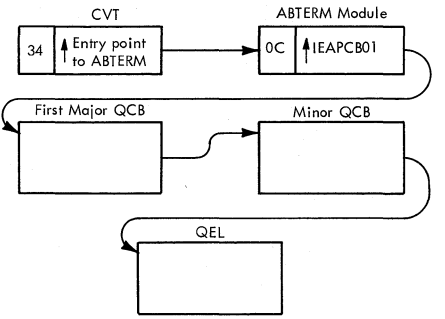


HOW TO FIND QCB's IN MFT

A. Locate CVT + 34 (hex) which is the pointer to the entry point of ABTERM. (See "How to Find QCB's in MVT").

B. The entry point of ABTERM + 0C is the pointer to IEAQCB01.

C. IEAQCB01 is the first major QCB and has the name HEADQCB. IEAQCB01 is the name for LMODMAP reference.



HOW TO FIND RESIDENT SVC LOAD LIST AND RAM LIST IN MFT

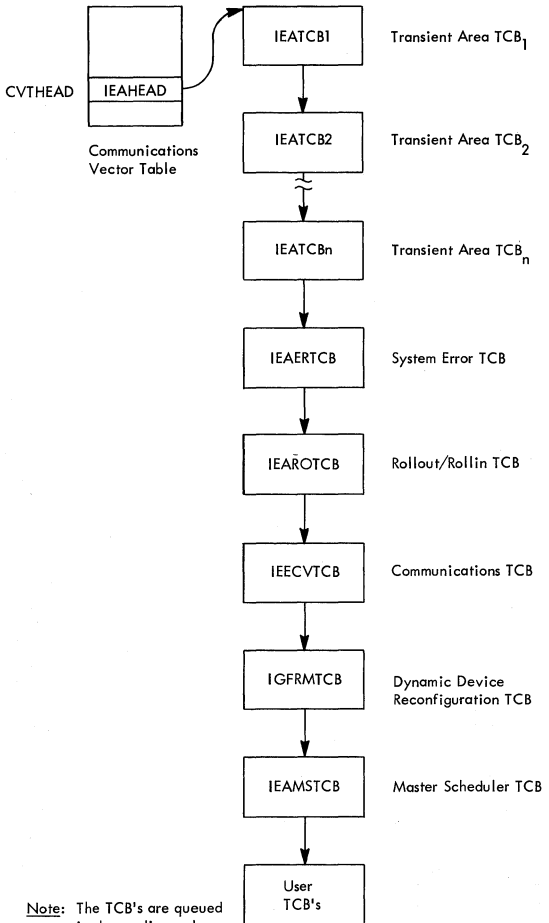
The resident SVC load list and RAMLIST pointers are two fullwords located before the constant IGG019 (C9C5C5 F0F1F9). The pointers are known as IEAARSV1 and IEAARAM4, respectively, and may be located from these names in LMODMAP. These constants are defined in IGC007,8 or LINK, XCTL and LOAD code if SYSGEN listing is available for MFT.

HOW TO FIND TCB's IN MVT SYSTEM

A. Locate CVT using 10 hex or 4C hex.

B. CVT + A0 hex is CVTHEAD which is the pointer to the highest priority TCB. Each TCB points to the next lower dispatching priority TCB at offset 74 (hex).

POSITIONS OF PERMANENT SYSTEM TCB's ON TCB QUEUE -- MVT



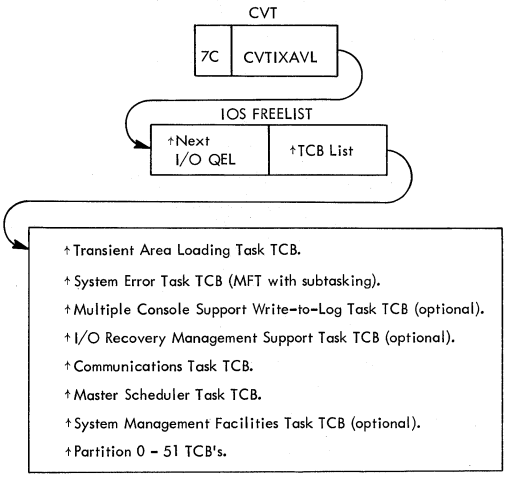
Note: The TCB's are queued in descending order of dispatching priority.

HOW TO FIND PARTITION TCB's IN MFT

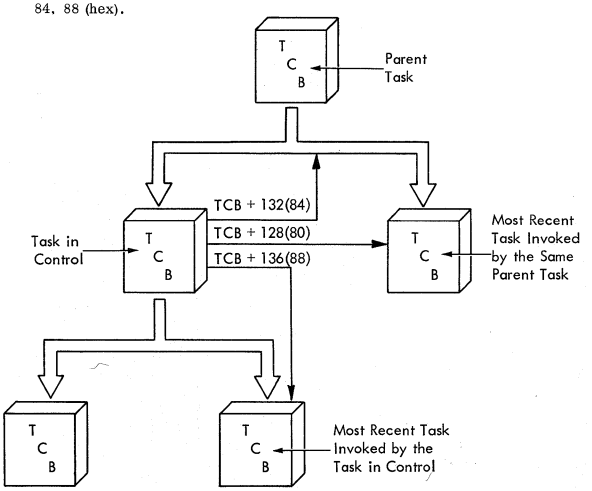
A. Locate CVT pointer (10 hex or 4C hex).

B. CVT + 7C is CVTIXAVL which points to IOS FREELIST.

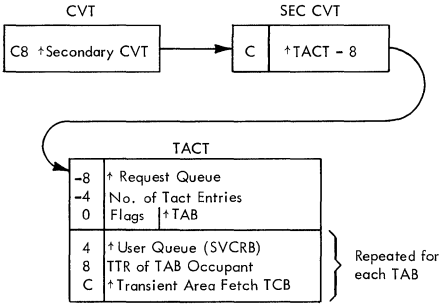
C. IOS FREELIST + 4 is the pointer to the first address in a list of TCB addresses.



D. Subtask TCB's, if present, can be found by using partition TCB's + 80, 84, 88 (hex).

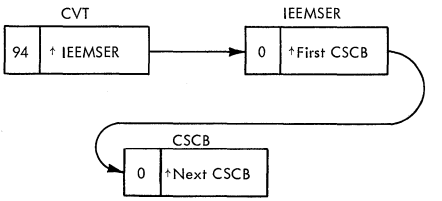


HOW TO FIND TRANSIENT AREA BLOCKS-- SVC TRANSIENT AREAS IN MVT



To locate transient area in MFT, find constant IEAAXSNT in an IMBMDMAP (LMODMAP) map of the nucleus; this constant is the transient area.

HOW TO FIND A CSCB (POINTERS IN HEX)



Comments:

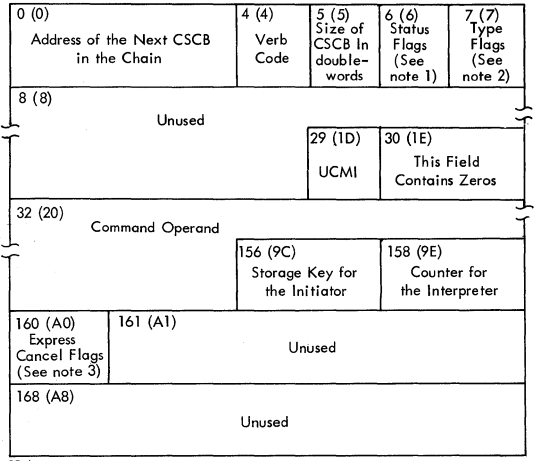
ABDUMP PARAMETER LIST

0(0)	1(1)	2(2)
ID	0	Option Flags
4(4)	5(5)	
0	Pointer to DCB	
8(8)	9(9)	
0	Pointer to TCB	
12(C)	13(D)	
0	Pointer to Storage List	

DESCRIPTION OF OPTION FLAGS

Byte	Bit	Symbolic Name	Meaning (when bit is set)
2	0	PFABEND	0 = ABEND request; 1 = SNAP request.
	1	PFTCB	TCB address is given.
	2	PFSUPDAT	Display all supervisor data.
	3	PFTRACE	Display trace table (if possible).
	4	PFNUC	Display the nucleus.
	5	PFSNAP	Snapshot list is given.
	6	PFID	ID given.
	7	PFQCB	Display the QCB's.
3	0	PFSAVE	Save area (see next flag).
	1	PFSAVE2	0 = display entire save area; 1 = display headings only.
	2	PFREGS	Display registers on entry to ABEND or SNAP.
	3	PFLPA	Display link pack area.
	4	PFJPA	Display job pack area.
	5	PFPSW	Display PSW on entry to ABEND or SNAP.
	6	PFSPALL	Display all subpools less than subpool 128.
	7		Reserved bit.

CSCB-INPUT
(Mapped by IEECHAIN)



Notes:

1. Status Flags

Bit 0 - Assignment pending.
Bit 1 - Reserved.
Bit 2 - On means H1 specified on CM
Off means H0 specified on CM.
Bit 3 - On means default to H0.
Off means no default.

The following four bits determine the function to be performed by SVC 34 when R1 contains the complemented address of the CSCB:

Bit 4 - Add this CSCB to the chain.
Bit 5 - Delete this CSCB from the chain.
Bit 6 - Free this CSCB's core.
Bit 7 - Execute branch entry to ABTERM.

2. Type flags indicating activity involved

Bit 0 - Reserved.
Bit 1 - Reserved.
Bit 2 - Initiator waiting for work.
Bit 3 - Special.
Bit 4 - Cancelable job step.
Bit 5 - Cancel communication switch.
Bit 6 - Cancelable (MFT11).
Bit 7 - System assigned procedure (MFT11).

3. Express cancel SYSOUT flags

Bit 0=1=All specified.
Bit 1=1=In specified.
Bit 2=1=Out specified.
Bit 3=1=Hold Q specified.
Bit 4=1=Specific queue.
Bit 5=1=Dump specified.
Bit 6=1=End scan switch.
Bit 7=1=Cancel all SYSOUT.

0 (0) Address of the Next CSCB in the Chain		4 (4) Verb Code	5 (5) Size of CSCB	6 (6) Status Flags	7 (7) Activity Flags	Header
8 (8) Procedure Identification or Task Name						
16 (10) Procedure Name						
24 (18) Unit Address of the Device Assigned to the Procedure	27 (1B) Protect Key	28 (1C) Unused	29 (1D) UCMI	30 (1E) CIB Count Field	31 (1E) Unused	
32 (20) Address of the STOP/MODIFY ECB		36 (24) Address of the CIB				
40 (28) Unused						
48 (30) STOP/MODIFY ECB		52 (34) CANCEL ECB				
56 (38) Communications Flags (See note 4)	57 (39) Address of the STC TCB	60 (3C) Address of the JCLS or JCT				
64 (40) Return Address for STC Exit		68 (44) Address of the SDT				
72 (48) Error Code	73 (49) Unused	76 (4C) Address of TCB for ABTERM				
80 (50) Queue Manager Parameter Area (Input Queue)						
116 (74) Queue Manager Parameter Area (Output Queue)						
152 (98) Address of the SPIL or Completion Code for ABTERM		156 (9C) Address of the Chain of Pending Start Commands				
160 (A0) Express CANCEL Flags	161 (A1) Unused	164 (A4) Address of the JSCB				
168 (A8) Unused						

4. Bit 0 Stop.
   Bit 1 Reader return with in-core JCT communition switches.
   Bit 2 Writer pause dataset.
   Bit 3 Writer pause forms.
   Bit 4 System task.
   Bit 5 Reserved.
   Bit 6 Reserved.
   Bit 7 Reserved.

COMMUNICATION VECTOR TABLE
(Pointed to by X'16'; mapped by CVT)

-4 (-4)	CVTRELNO Reserved
0 (0)	CVTTCBP Pointer to Address for Next and Current TCB
4 (4)	CVT0EF00 Address of Routine to Schedule Asynchronous Exits
8 (8)	CVTLINK Address of DCB for SYS1.LINKLIB
12 (C)	CVTJOB Address of Work Queue Control Blocks
16 (10)	CVTBUF Address of Buffer for Resident Console Interruption Routine
20 (14)	CVTXAPG Address of IOS Appendage Table
24 (18)	CVT0VL00 Address of Entry-Point of Address Validity Checking Routine
28 (1C)	CVTPCNVT Address of Entry-Point of Routine for Converting Relative Track Address to Absolute
32 (20)	CVTPRLTV Address of Entry-Point of Routine for Converting Absolute Track Address to Relative
36 (24)	CVTILK1 Address of Channel and Control Unit Section in UCB Lookup Table
40 (28)	CVTILK2 Address of UCB Address List Portion in UCB Lookup Table
44 (2C)	CVTXTLER Address of Entry-Point to XCTL Routine for Systems Error Routines
48 (30)	CVTSYSAD Address of System Residence Volume Entry in UCB Table

52 (34)	CVTBTERM Address of Entry-Point of ABTERM Routine
56 (38)	CVTDATE Current Date in Packed Decimal
60 (3C)	CVTMSLT PCP: Address of Master Resident Core MFT, MVT: Address of Master Scheduler Resident Data Area
64 (40)	CVTZDTAB Address of I/O Device Characteristic Table
68 (44)	CVTXITP Address of Error Interpreter Routine
72 (48)	CVTDAR Address of the I/O Control Block Complex Accessed by DAR
76 (4C)	CVT0FN00 Entry-Point Address to FINCH
80 (50) CVTEXIT An SVC 3 Instruction	82 (52) CVTBRET A BCR 15, 14 Instruction
84 (54)	CVTSVDCB Address of DCB for SYS1.SVCLIB
88 (58)	CVTTPC Address of Pseudo Clock for Timer Routine
92 (5C)	CVTPBLDL Address of BAL Entry-Point to BLDL Routine
96 (60)	CVTSJQ Address of Selected Job Queue
100 (64)	CVTCUCB Address of Table with Console UCB Address (UCM)
104 (68)	CVTQTE00 Address of Timer Enqueue Routine
108 (6C)	CVTQTD00 Address of Timer Dequeue Routine

112 (70)	CVTSTB Address of I/O Device Statistics Table
116 (74)	CVTDCB System Configuration, Address of DCB for SYS1.LOGREC (see note 1)
120 (78)	CVTIOQET Address of Request Element Table
124 (7C)	CVTIXAVL Address of IOS Freelist Pointer
128 (80)	CVTNUCB Lowest Storage Address Not in Nucleus
132 (84)	CVTBOSV Address of Program Fetch Routine
136 (88)	CVT0DS Address of Entry-Point of Dispatcher
140 (8C)	CVTILCH Address of Logical Channel Word Table
144 (90)	CVTIERLC Address of Asynchronous Exit Queue
148 (94)	CVTMSER PCP: Address of Major QCB MFT, MVT: Address of Master Scheduler Resident Data Area
152 (98)	CVT0PT01 Address of Branch Entry-Point for Post Routine
156 (9C)	CVTTRMTB Address of Terminal Table for QTAM
160 (A0)	CVTHEAD Address of Highest Priority TCB in Ready Queue
164 (A4)	CVTMZ00 Highest Storage Address in Machine
168 (A8)	CVT1EF00 Address of IRB Creation Routine

172 (AC) CVTQOCR
PCP: Reserved
MFT, MVT: Address of a GFX Parameter List Word, or Zeros

176 (B0) CVTQMWR
PCP: Reserved
MFT, MVT: Address of Queue Manager's Communication Data Area

180 (B4)	182 (B6)	183 (B7)
CVTSNCTR PCP, MFT, MVT: Serial Number Counter	CVTOPTA Flags (see note 2)	Reserved

184 (B8)	187 (BA)
PCP: CVTCRTTR - TTR of JCT for Restart	PCP: CVTSTUSA (see note 3)

CVTQCDSR MFT: (without Link Library Option) - Reserved
(with Link Library Option) - Reenterable Load Module Queue Search Routine Address
MVT: CDE Search Routine Address

188 (BC) PCP: Reserved

CVTQLPAQ MFT: (without Link Library Option) - Reserved
(with Link Library Option) - Reenterable Load Module Queue Address
MVT: Address of Top CDE in LPA Queue

192 (C0) CVTMPCVT
PCP, MFT: Reserved
MVT: Address of M65MP Secondary CVT

196 (C4) CVTSMCA
PCP: Must be Zeros
MFT, MVT: Address of the SMCA

200 (C8) CVTABEND
PCP, MFT: Reserved
MVT: Address of Secondary CVT

204 (CC) CVTUSER
PCP, MFT, MVT: Field Available to the User
207 (CF)

MFT, MVT Extension

208 (D0)
MFT, MVT: Reserved

212 (D4) CVTQABST	214 (D6) CVTLNKSC
MFT: Reserved MVT: An SVC 13 Instruction	MFT with Subtasking: An SVC 6 Instruction (LINK) MVT: Reserved

216 (DC) CVTTSCE
MFT: Address of TSCE
MVT: Address of First TSCE
219 (DF)

MFT with Subtasking Extension

244 (F4) CVTTSKS Maximum No. of TCB Address Table Entries	245 (F5) CVTTAT Pointer to Partition 0 TCB Address Table
248 (F8) CVTSYST Number of Sysgened TCB's	

Notes:

1. CVTDCB — System configuration.

   10 MVT - Uniprocessing.
   14 MVT - Multiprocessing.
   20 MFT
   40 PCP

2. CVTOPTA

xxx.	MFT, MVT (indicates which RMS options are present):
1...	Channel Check Handler (CCH).
.1..	Alternate Path Retry (APR).
..1.	Dynamic Device Reconfiguration (DDR).
...1	NIP is executing.
.... .x..	MVT (hierarchy Support option indicator):
.... .1..	Hierarchy Support is included.
.... .0..	Hierarchy Support is not included.
.... x.xx	Reserved bits.

3. CVTSTUSA — PCP: Status byte A.

xxxx ...x	Reserved bits.
.... 1...	A requested automatic checkpoint/restart was initiated for the job step that caused ABEND processing.
.... .1..	A requested automatic step restart was initiated for the job step that caused ABEND processing.
.... ..1.	DD DATA statement in input stream. The bit is set to 0 when the data following the statement is completely read.

Comments:

SECONDARY COMMUNICATIONS VECTOR TABLE

(Pointed to by CVT)

This table appears in module IEAQET00, beginning at symbolic location IEABEND.

← 4 bytes →
0(0) SCVTPGTM Address of EOT Purge Timer Routine (IEAQPGTM)
4(4) SCVTPGWR Address of WTOR Purge Routine (IEECVPRG)
8(8) SCVTSPET Address of Release Main Storage Routine (IEAQSPET)
12(C) SCVTACT Address of TACT (IEAQTAQ)
16(10) SCVTERAS Address of EOT Erase Phase Routine (IEAQERA)
20(14) SCVTQCBO Address of QCB Origin (IEAQQCBO)
24(18) SCVTPGEQ Address of ENQ/DEQ Purge Routine (IEA0EQ01)
28(1C) SCVTRMBR Address of REGMAIN Branch Entry (RMBRANCH)
32(20) SCVTPGIO Address of SVC Purge Routine (IGC016)
36(24) SCVTRACE Address of Trace Routine Switch (IECXTRA)
40(28) SCVTTASW Address of Task Switching Routine (IEA0DS02)
44(2C) SCVTCDCL Address of CDCONTRL in Common Subroutines of Contents Supervision (IEAQCS02)
48(30) SCVTLFRM Branch Entry Point to the FREEMAIN Routine (FMBRANCH)
52(34) SCVTPABL Address of Release Loaded Programs Routine in EOT (IEAQABL)

4 bytes	
56(38)	SCVTDQTC Address of Dequeue TCB Routine in EOT (IEADQTCB)
60(3C)	SCVTHSKP Address of CDHKEEP in the CDEXIT Routine (CDHKEEP)
64(40)	SCVTRPTR Address of Trace Table Pointers (TRPTR)
68(44)	SCVTGMBR List Format GETMAIN Branch Entry Point (GMBRANCH)
72(48)	SCVTAUCT Transient Area User Count (TAUSERCT)
76(4C)	SCVTROCT Address of Rollout Counters (IEARCTRS)
80(50)	SCVTROQ Address of Rollout Queue (IEAROQUE)
84(54)	SCVTRIRB Address of Rollout IRB (IEAROIRB)
88(58)	SCVTRTCB Address of Rollout TCB (IEAROTCB)
92(5C)	SCVTCOMM Address of Communications Task Routine (IEECVCTW) for Damage Assessment Routines (DAR)
96(60)	SCVTABLK Entry to ABTERM Routine (SCEDWAIT) for Damage Assessment Routines (DAR)
100(64)	SCVTNFND Entry to Transient Area Handler Routine (IBNOTFND) for Damage Assessment Routines (DAR)
104(68)	SCVTSWT Zero
108(6C)	SCVTMSSQ Address of GOVRFLB
112(70)	SCVTCTCB Address of Communications Task TCB (IEECVTCB)
116(74)	SCVTETCB Address of System Error TCB (IEAERTCB)

COMMUNICATIONS VECTOR TABLE - MULTIPROCESSING
(Pointed to by CVT)

MPCVT

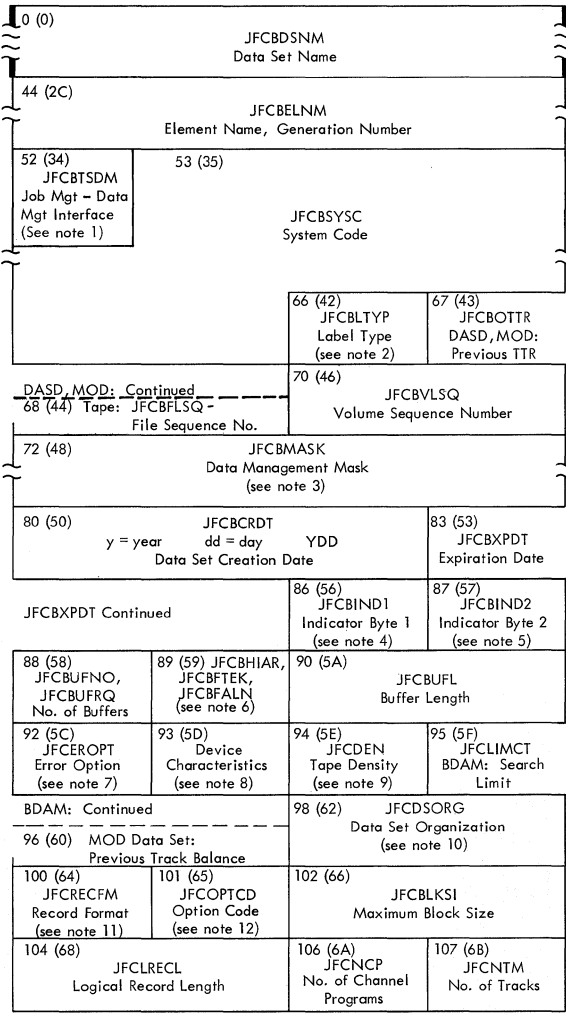
0(0)	CVTAFFLK (see note)
4(4)	CVTSTPTR Address of SHOLDTAP Routine
8(8)	CVTWTTCB Address of Dispatcher Wait Task
12(C)	CVTTKRM Address of Task Removal Routine (TEST DSP)
16(10)	CVTGOV Address of GOVRFLB Table
20(14)	CVTIOTIO Address of Multiprocessing Unit TIO Routine in IOS
24(18)	CVTTIOTCH Address of Multiprocessing Unit TCH Routine in IOS
28(1C)	CVTSTOR Address of Notify Storage On-line Routine
32(20)	CVTVRYOF Address of Deferred Vary Storage Off-line Routine

Note:

CVTAFFLK

Byte 0	Affinity byte
Hex C1	CPU A is executing disabled.
Hex C2	CPU B is executing disabled.
Hex 00	Neither CPU is executing disabled.
Byte 1	Lock byte
Hex FF	Supervisor code has been locked.
Hex 00	The lock is not set.
Bytes 2-3	Reserved.

JOB FILE CONTROL BLOCK
(Mapped by IEFJFCBN)



Notes:

1. JFCBTSDM — Job management/data management interface.

1...	Data set is cataloged.
.1..	Volume serial list has been changed.
..1.	Data set is a SYSIN or SYSOUT.
...1	A job step is to be restarted. (This job had ABEND processing for a data set opened for MOD.)
.... 1...	Do not write back the JFCB during OPEN processing.
.... .1..	Do not merge DSCB or label fields into this JFCB.
.... ..1.	Do not merge DCB fields into this JFCB.
....1	The patterning DSCB is complete.

2. JFCBLTYP — Label type.

	Code	
xxx.		Reserved bits.
...1	BLP	Bypass label processing.
.... 1.1.	SUL	User label.
.... .1..	NSL	Nonstandard label.
.... ..1.	SL	Standard label.
....1	NL	No label.

3. JFCBMASK — Data management mask.

Bytes 1-5	Open routine internal switches.
Byte 6	
1...	Volume label processing required.
.1..	Creation of a standard label is necessary.
..1.	Destruction of a standard label is necessary.
...1	Dual-density check detected.
.... xxxx	Open routine internal switches.
Byte 7	
1...	Treat the INOUT option of OPEN as INPUT.
.1..	Treat the OUTIN option of OPEN as OUTPUT.
..1.	Set only in a JFCB recorded in a Data Set Descriptor Record (DSDR) by the checkpoint routine. Indicates that the data set related to the JFCB is being processed sequentially, at the checkpoint, on a volume other than the volume on which processing began in the current step. When restart occurs, the bit causes deferred volume mounting.
...1	Disposition of this data set has been changed from MOD to NEW. Disposition (in JFCBIND2) is restored to MOD after OPEN.
.... xxxx	Reserved bits.
Byte 8	Open routine internal switches.

Notes:

4. JFCBIND1 — Indicator byte 1.

11..	Release external storage.
..11	Data set has been located.
.... 11..	New volume has been added to the data set.
.... ..1.	Data set is a member of a generation data group.
....1	Data set is a member of a partitioned data set.

5. JFCBIND2 — Indicator byte 2.

01..	OLD data set.
10..	MOD data set.
11..	NEW data set.
..01	Data set security.
.... 1...	Shared.
.... .1..	Delete this JFCB before allocation for a restarted generation data group.
.... ..1.	Storage volume requested.
....1	Temporary data set.

6. JFCBHIAR, JFCBFTEK, JFCBFALN

	Code	
x... .x..		For access methods other than QTAM Buffer pool location, coded in the DD statement:
0... .0..	0	Hierarchy 0 main storage.
0... .1..	1	Hierarchy 1 main storage.
.xxx		Buffering technique:
.1..	S	Simple buffering.
.11.	A	Logical record interface for BSAM locate mode.
..1.	R	VS format BDAM data set is to be processed.
...1	E	Exchange buffering.
.... ..xx		Buffer alignment:
.... ..10	D	Doubleword boundary.
.... ..01	F	Fullword, not a doubleword boundary.

7. JFCEROPT — Error option. Disposition of permanent errors if user returns from a synchronous error exit. (QSAM)

1...	Accept.
.1..	Skip.
..1.	Abnormal end of task.
...x xxxx	Reserved bits.

8. Device characteristics field.

The content of this one-byte field depends upon the device in use.

MAGNETIC TAPE

JFCTRTCH — Tape recording technique for 7-track tape.

	Code	
0010 0011	E	Even parity.
0011 1011	T	BCD/EBCDIC translation.
0001 0011	C	Data conversion.
0010 1011	ET	Even parity and translation.

Notes:

8. continued

DIRECT-ACCESS STORAGE

JFCKEYLE — Direct-access key length.

CARD READER, CARD PUNCH

JFCMODE — Mode of operation.

	Code	
1000	C	Column binary mode.
0100	E	EBCDIC mode.

JFCSTACK — Stacker Selection.

	Code	
.... 0001	1	Stacker 1
.... 0010	2	Stacker 2

PRINTER

JFCPRTSP — Normal printer spacing.

	Code	
0000 0001	0	No spacing.
0000 1001	1	Space one line.
0001 0001	2	Space two lines.
0001 1001	3	Space three lines.

PAPER TAPE

JFCCODE — Conversion code.

	Code	
1000 0000	N	No conversion.
0100 0000	I	IBM BCD.
0010 0000	F	Friden.
0001 0000	B	Burroughs.
0000 1000	C	National Cash Register.
0000 0100	A	ASCII (8-track).
0000 0010	T	Teletype.

9. JFCDEN — Tape density for 2400 Series magnetic tape units.

	Code	7-track	9-track
0000 0011	0	200 bpi	-
0100 0011	1	556 bpi	-
1000 0011	2	800 bpi	800 bpi
1100 0011	3	-	1600 bpi

10. JFCDSORG — Data set organization being used.

Byte 1

	Code	
1...	IS	Indexed sequential organization.
.1..	PS	Physical sequential organization.
..1.	DA	Direct organization.
...x xx..		Reserved bits.
.... ..1.	PO	Partitioned organization.
....1	U	Unmovable - the data contains location dependent information.

Notes:

10. continued
Byte 2

0...	GS	Graphics organization.
.xxx xxxx		Reserved bits.

11. JFCRECFM — Record format.

	Code	
10..	F	Fixed.
01..	V	Variable.
11..	U	Undefined.
..1.	T	Track overflow.
...1	B	Blocked: may not occur with undefined (U).
.... 1...	S	Fixed-length record format: Standard blocks; no truncated blocks or unfilled tracks are embedded in the set. Variable-length record format: Spanned records.
.... .10.	A	ASA control character.
.... .01.	M	Machine code control character.
.... .00.		No control character.
....0		Always zero.

12. JFCOPTCD — Option codes.

QSAM, BSAM, BPAM

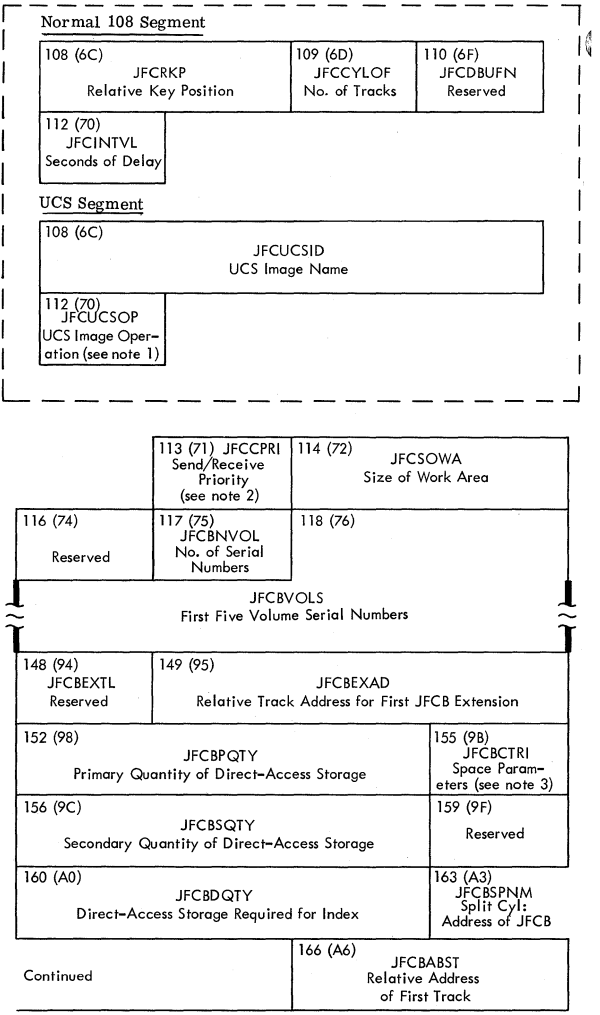
	Code	
1...	W	Write-validity check.
.1..	B	Bypass EOF recognition.
	U	1403 Printer with UCS feature: Allow a data check caused by an invalid character.
..1.	C	Chained scheduling using the program controlled interruption.
...1	H	Hopper-empty exit (Optical Reader, BSAM).
...1	O	On-line correction (Optical Reader, QSAM).
.... .1..	Z	For magnetic tape devices, use reduced error recovery procedure. (EXCP also)
.... ..1.	T	BSAM, QSAM only: User totaling.
.... x..x		Reserved bits.

BISAM, QISAM

	Code	
1...	W	Write-validity check.
.x.. .x..		Reserved bits.
..1.	M	Master indexes.
...1	I	Independent overflow area.
.... 1...	Y	Cylinder overflow area.
.... ..1.	L	Delete option.
....1	R	Reorganization criteria.

BDAM

	Code	
1...	W	Write-validity check.
.1..		Track overflow.
..1.	E	Extended search.
...1	F	Feedback.
.... 1...	A	Actual addressing.
.... .xx.		Reserved bits.
....1	R	Relative block addressing.


Normal 108 Segment
108 (6C)
JFCRKP
Relative Key Position
109 (6D)
JFCCYLOF
No. of Tracks
110 (6F)
JFCDBUFN
Reserved
112 (70)
JFCINTVL
Seconds of Delay
UCS Segment
108 (6C)
JFCUCSID
UCS Image Name
112 (70)
JFCUCSOP
UCS Image Operation (see note 1)
113 (71) JFCCPRI
Send/Receive Priority (see note 2)
114 (72)
JFCSOWA
Size of Work Area
116 (74)
Reserved
117 (75)
JFCBNVOL
No. of Serial Numbers
118 (76)
JFCBVOLS
First Five Volume Serial Numbers
148 (94)
JFCBEXTL
Reserved
149 (95)
JFCBEXAD
Relative Track Address for First JFCB Extension
152 (98)
JFCBPQTY
Primary Quantity of Direct-Access Storage
155 (9B)
JFCBCTRI
Space Parameters (see note 3)
156 (9C)
JFCBSQTY
Secondary Quantity of Direct-Access Storage
159 (9F)
Reserved
160 (A0)
JFCBDQTY
Direct-Access Storage Required for Index
163 (A3)
JFCBSPNM
Split Cyl: Address of JFCB
Continued
166 (A6)
JFCBABST
Relative Address of First Track

168 (A8) JFCBSBNM Main Storage Address of JFCB - Suballocate		171 (AB) JFCBDRLH Data Block Length
Continued	174 (AE) JFCBVLCT Volume Count	175 (AF) JFCBSPTN Split Cyl: No. of Tracks

Notes:

1. JFCUCSOP — Operation of the UCS image to be loaded.

x.x. xxxx	Reserved bits.
.1..	UCS image is to be loaded in the FOLD mode.
...1	UCS image is to be verified.

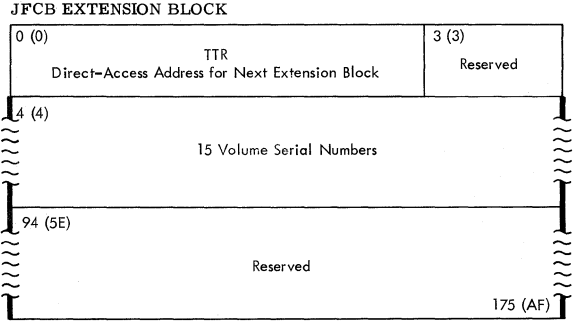
2. JFCCPRI — QTAM: Priority between send and receive operations.

	Code	
1...	S	Send priority.
.1..	E	Equal priority.
..1.	R	Receive priority.
...x xxxx		Reserved bits.

3. JFCBCTRI — Space parameters.

00..	ABSTR request.
01..	Average block length request.
10..	TRK request.
11..	CYL request.
..xx	Reserved bits.
.... 1...	CONTIG request.
.... .1..	MXIG request.
.... ..1.	ALX request.
....1	ROUND request.

JFCB EXTENSION BLOCK



0 (0)	JSCBWTP PCP, MFT, MVT: Address of the Write-to-Programmer Work Area
4 (4)	JSCBCSCB MFT, MVT: Address of the Command Scheduling Control Block

Comments:

PICA - PROGRAM INTERRUPTION CONTROL AREA

0 (0)	1 (1)
PICAPRMK (See note 1)	PICAEXIT Address of User's Routine to be Given Control When an Interruption of Specified Type Occurs
4 (4)	
Interruption Mask (See note 2)	

Notes:

1. PICAPRMK — Program mask.

0000 1...	Fixed-point overflow.
0000 .1..	Decimal overflow.
0000 ..1.	Exponent underflow.
0000 ...1	Significance.

2. Byte 1 — Interruption mask.

	Number	
01..	1	Operation.
0.1.	2	Privileged operation.
0..1	3	Execute.
0... 1...	4	Protection.
0... .1..	5	Addressing.
0... ..1.	6	Specification.
0... ...1	7	Data.

Byte 2

1...	8	Fixed-point overflow (maskable).
.1..	9	Fixed-point divide.
..1.	10	Decimal overflow (maskable).
...1	11	Decimal divide.
.... 1...	12	Exponent overflow.
.... .1..	13	Exponent underflow (maskable).
.... ..1.	14	Significance (maskable).
....1	15	Floating-point divide.

Comments:

PROGRAM INTERRUPTION ELEMENT (PIE)

Doubleword Boundary

0 (0) Flags (See note)	1 (1) PIEPICA Address of the current PICA
4 (4) PIEPSW PI Old PSW Stored at Program Interrupt Time	
12 (C) PIEGR14 Save Area for Register 14	
16 (10) PIEGR15 Save Area for Register 15	
20 (14) PIEGR0 Save Area for Register 0	
24 (18) PIEGR1 Save Area for Register 1	
28 (1C) PIEGR2 Save Area for Register 2	

Note:

1...	The task cannot accept any more PI's. (This bit is set whenever a user PI exit routine is entered. It is reset by the SVC exit routine.) This bit is called the first-time logic switch.
.xxx xxxx	Reserved bits.

Comments:

QUEUE CONTROL BLOCK

MAJOR QCB

0 (0) Address of Next Major QCB (If Last, Equals Zero)
4 (4) Address of Previous Major QCB (If First, Equals IEAQQCB)
8 (8) Address of First Minor QCB on Queue of Minors
12 (C) Major QCB Name (First Four Characters)
16 (10) Major QCB Name (Last Four Characters)

MINOR QCB

0 (0) Address of the First QEL on the QEL Queue		
4 (4) Address of the Previous Minor QCB (If First, Equals Major QCB)		
8 (8) Address of the Next Minor QCB (If Last, Equals Zero)		
12 (C) Length of QCB Name	13 (D) QCBPKF (See note)	14 (E) Minor QCB Name (Variable in Length From 1-255 Characters)

Note: QCBPKF -- If field is FF, the name is known to the entire system. If field is 00, 10, 20, 30, or F0, it is the protection key of the TCB under which the request was enqueued. In this case, the name is known only to the the job step.

QUEUE ELEMENT (QEL)

0 (0) SMC (See note 1)	1 (1) Address of Next QEL Zero if This is Last QEL
4 (4) CODE (See note 2)	5 (5) Address of Previous QEL Address of Minor QCB if This QEL is First on QEL Queue
8 (8) Address of TCB That was Current When ENQ Macroinstruction was Issued	
12 (C) Address of SVRB for ENQ Routine	

Notes:

1. SMC — Indicates whether the QEL represents a request for "must complete" status.

   X'20' — Represents a "system must complete" request.
   X'10' — Represents a "step must complete" request.
   X'00' — Represents "must complete" status not requested.

2. CODE

   0... .... — An exclusive request.
   1... .... — A shared request.
   .1.. .... — If shared DASD is included in the system, a UCB address appears at byte 12 of this QEL. This QEL is associated with a RESERVE macroinstruction, instead of an ENQ macroinstruction.

Comments:

PARAMETER LIST ELEMENT (FOR THE ENQ/DEQ ROUTINES)

0 (0) LISTEND (See note 1)	1 (1) LMINOR (See note 2)	2 (2) PARMCDS (See note 3)	3 (3) Return (See note 4)
4 (4) Major Name The Address of the Major Resource Name (Qname).			
8 (8) Minor Name The Address of the Minor Resource Name (Rname).			

Notes:

1. LISTEND — Indicates the last element in the parameter list. The last element must have hex FF in this field. All other elements in the list may have any other value.

2. LMINOR — The length of the minor name whose address is at offset 8, or zero. If LMINOR contains zero, the length of the minor name is assumed to be in the first byte of the name field whose address is at offset 8. In this case, the length byte does not include its own length.

3. PARMCDS — ENQ/DEQ parameters.

0...	Exclusive request.
1...	Shared request.
.0..	Minor name is known only to job step.
.1..	The scope of the minor name is SYSTEM.
..1.	Set must complete = SYSTEM.
...1	Set must complete = STEP.
.... .xxx	RETURN.
.... .000	RET = NONE.
.... .001	RET = HAVE.
.... .011	RET = USE.
.... .111	RET = TEST.
.... x...	Reserved bit.

4. RETURN — Return code field for codes returned to the issuer of the ENQ or DEQ macroinstruction.

Comments:

PROGRAM EXTENT LIST (LRB, LPRB, PRB)

+0 (+0)	XLISTLH0 Length of Program Extent in Hierarchy 0
+4 (+4)	XLISTLH1 Length of Program Extent in Hierarchy 1
+8 (+8)	XLISTAH0 Address of Program Extent in Hierarchy 0
+12 (C)	XLISTAH1 Address of Program Extent in Hierarchy 1

FRB

-8 (-8)	XRBSUC Pointer to RB of Previously Loaded Program	
-4 (-4)	XRBPRE Pointer to RB of Program Loaded Immediately After This One	
0 (0)	XRBNM Program Name (See note 1)	
8 (8)	XRBSZ	10 (A) XRBSTAB (See note 2)
12 (C)	XRWTL Address of Most Recent Wait List Element	
16 (10)	XREQ Pointer to the TCB of the Requesting Task	
20 (14)	XRTLPRB Pointer to the LPRB Built by FINCH	

Notes:

1. XRBNM

Contents of this field depend on the use of this block. The use of this request block is shown by bits 0-3 of byte 1 of the XSTAB field at offset 10 (dec), A (hex).

LPRB, LRB, PRB, FRB
Program name.

IRB
For timer, first byte contains flags; for all other uses, first byte contains no meaningful information.

Notes:

SIRB
8-character name of the error routine currently occupying the 400 hex byte I/O supervisor transient area.

SVRB
Type 2 SVC:
No meaningful information.
Type 3 or 4 SVC:

Bytes 0-3: TTRN address, on the SVC library, of the load module. N, the concatenation number, is 0.

Bytes 4-7: Four digit number of the form ysss. y = number of the current phase of the routine. (First or only phase: y = 0). sss = SVC number in unpacked decimal (signed) form.

2. **XRBSTAB** Flag bytes.

Byte 1

xxxx .... These bits are used to distinguish between the LPRB, LRB, PRB, FRB, IRB, SIRB, and the SVRB. The bits have the following definitions:

0000 .... PRB -- The program was not loaded via a LOAD macroinstruction, and does not have minor entries identified via an IDENTIFY macroinstruction.

0001 .... PRB -- The program was not loaded via a LOAD macroinstruction, and does have minor entries identified via an IDENTIFY macroinstruction.

0010 .... LPRB -- The program was loaded via a LOAD macroinstruction, and does not have minor entries identified via an IDENTIFY macroinstruction.

0011 .... LPRB -- The program was loaded via a LOAD macroinstruction, and does have minor entries identified via an IDENTIFY macroinstruction.

0100 .... IRB.

0101 .... FRB.

1000 .... SIRB.

1100 .... SVRB -- The program is a type 2 SVC routine or a type 3 or 4 SVC routine that has not yet been loaded.

1101 .... SVRB -- The program is a type 3 or 4 SVC routine that has been loaded.

1110 .... LPRB -- This block describes a minor entry identified via an IDENTIFY macroinstruction.

1111 .... LRB.

.... 1... The type 3 or 4 SVC routine is resident.

.... .1.. A checkpoint may be taken in a user exit from this SVC routine.

.... ..1. LRB, LPRB, PRB: The program was hierarchy-block loaded. A program extent list exists.

....1 Refreshable module.

Notes:

	Byte 2	FRB only:
	0...	Module being loaded is reentrant.
	1...	Module being loaded is not reentrant.
	.0..	The finch routine has not executed a GETMAIN macroinstruction.
	.1..	The finch routine has executed a GETMAIN macroinstruction.
	..x. xxxx	Reserved bits.
	Byte 2	All RB's except FRB's:
	1...	XRBLNK field points to the TCB.
	.1..	Active program.
	..1.	Registers 2-14 to be restored from XRBREG.
	...1	Reenterable or reusable program.
	.... 00..	IRB has no interrupt queue elements.
	.... 01..	IRB has interrupt queue elements which are request elements.
	.... 10..	MFT only: This is a dummy LPRB in a partition for a program in the reenterable load module area. The LPRB for the program is in the reenterable load module area.
	.... 11..	IRB has interrupt queue elements that are not request elements.
	.... ..1.	Request block storage is to be freed when program returns.
	1	Wait on less than the number of specified events.
	0	Wait on a single event or all of the specified events.
3.	XRBQ	IRB: Address of a 12-byte or 16-byte request element. LPRB: Address of an LPRB describing an entry identified via the IDENTIFY macroinstruction. PRB: Address of an LPRB describing an entry identified via the IDENTIFY macroinstruction. SIRB: Address of a 12-byte or 16-byte request element. SVRB: For type 3 and type 4 SVC's, this field contains the size of the program in bytes.

STAE CONTROL BLOCK (SCB)

0 (0) Reserved	1 (1) Address of Previous SCB or Zero, if First SCB
4 (4) Address of STAE Exit Routine	
8 (8) Reserved	9 (9) Address of STAE Exit Routine Parameter List
12 (C) Flags (See note)	13 (D) Address of RB

Note:

FLAGS	STAE flags.
1...	SCB is not cancelled by exit routine when XCTL is issued.
.1..	ISAM/TAM switch.
..xx xxxx	Reserved bits.

Comments:

0 (0) SMCAOPT SMF Options (See note 1)	1 (1) SMCAMISC Miscellaneous Indicators (See note 2)	2 (2) SMCATOFF SMF TIOT Offset
4 (4) SMCATIOT Address of the Master Scheduler TIOT		
8 (8) SMCAJWT Job Wait Time Limit		
12 (C) SMCABUF One-Half SMF Buffer Size		
16 (10) SMCASID System Identification		18 (12) SMCAMDL CPU Model Number
20 (14) SMCABUFP Address of the SMF Buffer		
24 (18) SMCAPDEV Volume Serial Number of Primary SMF Data Set		
Continued	30 (1E) SMCAPSTA Primary Device Status (See note 3)	31 (1F) SMCAPDAR Primary Device Address
Continued	34 (22) SMCAPLBL Primary Label Status (See note 4)	35 (23) SMCAXORY Contains an X or Y
36 (24) SMCAPDCB Address of Primary DCB		
40 (28) SMCAADEV Volume Serial Number of Alternate SMF Data Set		
	46 (2E) SMCASTA Alternate Device Status (See note 5)	Alternate Device Address
Continued	50 (32) Alternate Label Status (See note 6)	51 (33) Contains an X or Y
62 (34) SMCAADCB Address of Alternate DCB		
56 (38) SMCAWECB SMF Writer ECB		

60 (3C) SMCABECB SMF Buffer ECB			
64 (40) SMCASGWR Number of Record Segments Required for Logical Record			
68 (44) SMCASGFT Number of Record Segments That Fit into Data Set			
72 (48) SMCAWAIT Accumulated Wait Time			
80 (50) SMCAENDI Data Set Was/ Was Not Found (See note 7)	81 (51) SMCAENOP SMF Open Data Set Switch	82 (52) Reserved	83 (53) Reserved
84 (54) SMCAWRTP Optimum Buffer Write Point			
88 (58) SMCAXCTL Address of XCTL Name			
92 (5C) DCB Pointer (Zeros)			
96 (60) SMCAXNAM XCTL Name			
104 (68) SMCASWA Switches (See note 8)	105 (69) SMCASWB Reserved	106 (6A) SMCASWC Reserved	106 (6B) SMCASWD Reserved
108 (6C) SMCADSTM Time and Date Data Sets are Full Data Not Recorded After this Time			
116 (74) SMCADSCT Count of Lost Records 119 (77)			

Notes:

1. SMCAOPT — Contains the SMFDEFLT options selected at initialization time.

1...	Job accounting.
.1..	Step accounting.
..1.	User exits will be taken.
...1	Data set accounting.
.... 1...	Volume accounting.
...1 .1..	Tape error statistics by volume (ESV) accounting to be included in SMF record types 14 and 15 for tape data sets.
...1 ..1.	Type 17 records maintained for temporary data sets.
....x	Reserved bit.

Notes:

2. SMCAMISC — Miscellaneous indicators.

x...	Type of SMF recording requested.
.x..	SYS1.MAN data set is/is not present.
1...	SMF and user recording requested.
0...	Only user records to be recorded.
.0..	SYS1.MAN data set is not present.
.1..	SYS1.MAN data set present.
...1	SMF data set to be opened.
.... ..0.	Left-half of buffer in use.
.... ..1.	Right-half of buffer in use.
..x. xx.x	Reserved bits.

3. SMCAPSTA — Primary SMF data set device status.

1...	Data set is not available for recording.
..1.	This is a direct-access device.
...1	The data set is empty.
.... ..1.	Device address is defined.
....1	Volume serial number is defined.
.x.. xx..	Reserved bits.

4. SMCAPLBL — Label status of the primary SMF data set.

xxxx x...	Reserved bits.
.... .1..	Nonstandard label (NSL).
.... ..1.	Standard label (SL).
....1	No label (NL).

5. SMCASTA — Alternate SMF data set device status.

1...	Data set is not available for recording.
..1.	This is a direct-access device.
...1	The data set is empty.
.... ..1.	Device address is defined.
....1	Volume serial number is defined.
.x.. xx..	Reserved bits.

6. Label status of the alternate SMF data set.

xxxx x...	Reserved bits.
.... .1..	Nonstandard label (NSL).
.... ..1.	Standard label (SL).
....1	No label (NL).

7. SMCAENDI — Communication field.

00	Data set (X or Y) was found.
01	Data set (X or Y) was not found.

8. SMCASWA — Indicator bits.

.1..	Both data sets are full; SMF is not recording.
..1.	OPEN failure on SMF data set. SMF is not recording.
...1	Next allocation must be for a direct-access device.
.... 1...	Allocation search is by volume serial number.
.... .1..	SMF halt-end-of-day is processing.
.... ..1.	Entry to the writer is for a space check of the data set.
....1	Entry to the writer is for data set switching only.
x...	Reserved bit.

TIMING CONTROL TABLE

0 (0) TCTQA Reserved	3 (3) TCTSW TCT Switches (See note)
4 (4) TCTTCB Initiator TCB Address	
8 (8) TCTCRTBL TCT Storage Table Starting Address	
12 (C) TCTIOTBL TCT I/O Table Starting Address	
16 (10) TCTPOOL Subpool Number and Size of TCT	
20 (14) TCTUTL MFT: Zeros MVT: Address of User Time Limit Routine (IEFUTL)	
24 (18) TCTUDATA Address of User Parameter List	
28 (1C) TCTJMR Address of the Job Management Record	
32 (20) TCTUSO MFT: Zeros MVT: Address of User Output Limit Routine (IEFUSO)	
36 (24) TCTSTOF Step Time Extension Overflow Field	
40 (28) TCTSACT Total Step Time Extension	
44 (2C) TCTWLMT Job or Step Maximum Wait Time Limit	

PROCESSOR STORAGE TABLE

48 (30) TCTLWM Highest Address Allocated From Bottom of Region	
52 (34) TCTHWM Lowest Address Allocated From Top of Region	
56 (38) TCTMINC Minimum Difference Between TCTHWM and TCTLWM in 2K Blocks	58 (3A) TCTRSZ Region Request in 2K Blocks
60 (3C) TCTRBC Accumulated Rollout Obtained Storage	62 (3E) TCTMBC Total Rollout Obtained Storage

HIERARCHY SUPPORT - STORAGE TABLE

64 (40) TCTLWM Highest Address Allocated From Bottom of Region	
68 (44) TCTHWM Lowest Address Allocated From Top of Region	
72 (48) TCTMINC Minimum Difference Between TCTHWM and TCTLWM in 2K Blocks	74 (4A) TCTRSZ Region Request in 2K Blocks
76 (4C) TCTRBC Accumulated Rollout Obtained Storage	78 (4E) TCTMBC Total Rollout Obtained Storage 79 (4F)

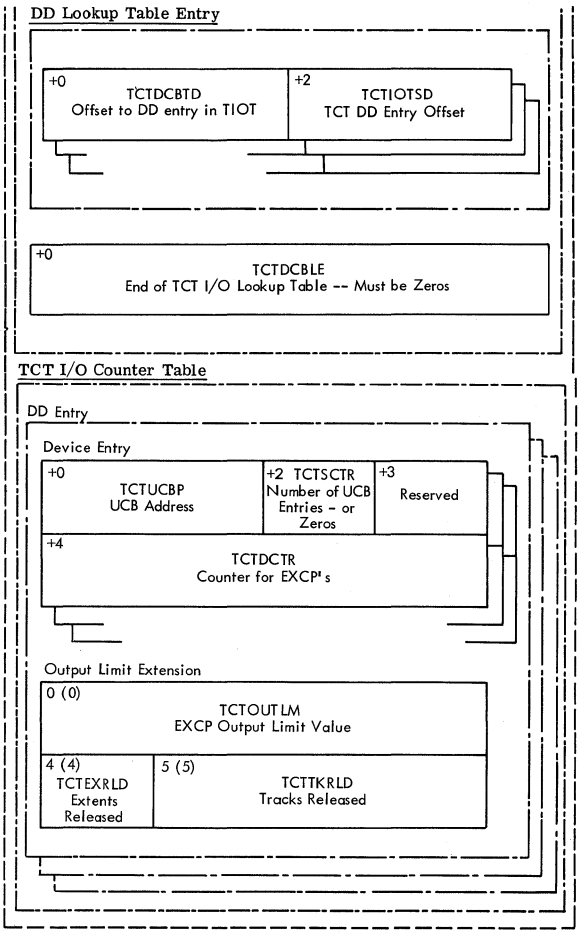
Note:

TCTSW	Timing control table switches.
0...	TQE contains step time.
1...	TQE contains job time.
.xxx xxxx	Reserved bits.

TCT EXTENSION

TCT I/O Lookup Table

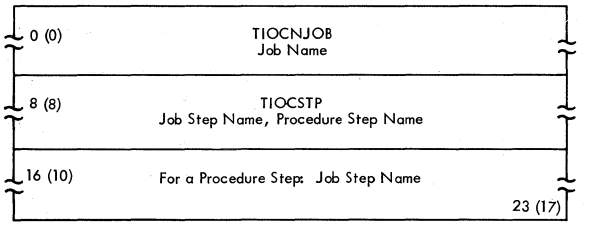
0 (0) TCTPLEXT Subpool Number and Size of TCT Extension (See note)	
4 (4) TCTSZLKP Size of TCT I/O Counter Table	6 (6) Reserved



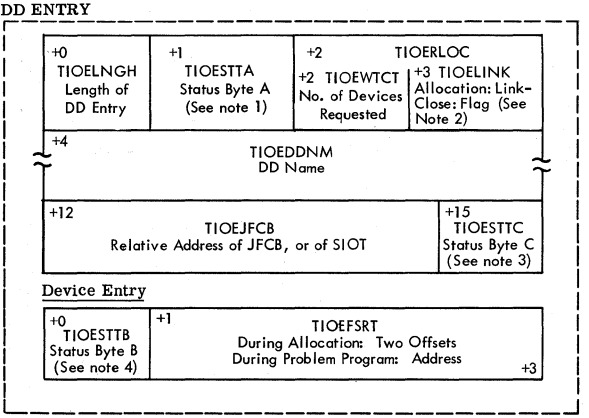
Note:

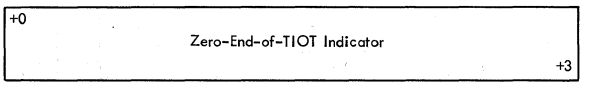
TCTPLEXT	Subpool and TCT I/O table size.
Byte 1	Subpool in which the TCT I/O table resides.
Byte 2-4	Size in bytes of the TCT I/O table.

TASK INPUT/OUTPUT TABLE



DD ENTRY





Comments:

Notes:

1. TIOESTTA — Status byte A.

x... .x..	Tape label processing to be performed: NL, BLP. SL, SUI. NSL.
0... .0..	
0... .1..	
1... .0..	
.1..	During allocation: Split cylinder primary. (This is the first DD entry for a split cylinder.) During step termination: No unallocation necessary.
..1.	During allocation: Split cylinder secondary. (This is not the first DD entry for a split cylinder.) During step termination: Rewind but no unloading.
...1	JOBLIB indicator.
.... 1...	DADSM allocation necessary.
.... ..1.	Tape data sets - rewind/unload the tape volume.
....1	Tape data sets - rewind the tape volume.

2. TIOELINK

	During allocation: Link to the appropriate prime split, unit affinity, volume affinity or suballocate TIOT entry. entry. After CLOSE:
1...	This is a SYSOUT data set that contains data.
.xxx xxxx	Reserved bits.

3. TIOESTTC — Status byte C. Used during allocation only. Set to zeros at end of allocation.

1...	Secondary suballocate.
.1..	Deferred mount.
..1.	Primary unit affinity.
...1	Secondary unit affinity.
.... 1...	Primary volume affinity.
.... .1..	Secondary volume affinity.
.... ..1.	Primary suballocate.
....1	Secondary suballocate.

4. TIOESTTB — Status byte B.

	During allocation and during problem program:
1...	Data set is on device.
.1..	Data set uses device.
..1.	Device violates separation.
...1	Volume serial present.
.... 1...	Setup message required.
.... .x..	Disposition:
.... .1..	Retain unloaded volume if unload required.
.... .0..	Delete unloaded volume if unload required.
.... ..1.	Unload required.
....1	Verification required.

TIMER QUEUE ELEMENT (TQE)

0 (0) TQEFLGS Indicators (See note)	1 (1) TQETCB Address of TCB
4 (4) Zeros	5 (5) TQEFLNK Address of Next Queue Element
8 (8) Zeros	9 (9) TQEBLNK Address of Preceding Queue Element
12 (C) TQEVAL Time of Expiration/Time Remaining	
16 (10) TQELHPSW First Word of Current PSW - Used When TQE Serves as IRB	
20 (14) TQESAV Used to Save Contents of TQEVAL When TQE is Converted from TASK to REAL	
24 (18) TQESAADR Address of Processing Program Save Area	
28 (1C) Zeros	TQEEXIT Address of Timer Asynchronous Exit Routine
32 (20) TQEGRS Register Save Area - Used When TQE Serves as IRB	
96 (60) TQEECB Used for Interruption Queue Element When TQE Serves as IRB (16 bytes)	
TQEIQE Used for ECB When WAIT Parameter is Given in STIMER Macro-Instruction	

Note:
TQEFLGS

	1...	Timer element is not on timer queue.
	.1..	Local TOD option is used.
	..xx	
	..00	TUINTVL requested.
	..01	BINTVL requested.
	..10	Reserved.
	..11	DECINTVL requested.
	.... 1...	Interval is completed.
	.... .1..*	Exit Specified.
	xx	
	00	Task request.
	01	Wait request.
	.... ..10*	Supervisory element.
	11	Real request.
*	.... .110	Denotes the midnight supervisory timer element.

TSCE - TIME-SLICE CONTROL ELEMENT

TSCE - MFT (NO SUBTASKING)

0 (0) FIRST - Address of the First Time-Slice TCB on the TCB Queue
4 (4) LAST - Address of the Last Time-Slice TCB on the TCB Queue
8 (8) NEXT - Address of the Next Time-Slice TCB to be Dispatched
12 (C) LENGTH - Time-Slice Length (See note 1)

TSCE - MFT WITH SUBTASKING

0 (0) Highest Dispatching Priority	1 (1) FIRST - Address of the First Time-Slice TCB
4 (4) Lowest Dispatching Priority	5 (5) LAST - Address of the Last Time-Slice TCB
8 (8) NEXT - Address of the Next Time-Slice TCB	
12 (C) LENGTH - Time-Slice Length (in Milliseconds)	

TSCE - MVT

0 (0) Dispatching Priority	1 (1) Address of First TCB
4 (4) 0	5 (5) Address of Last TCB
8 (8) 0	9 (9) Address of Next TCB to be Dispatched
12 (C) TSCE Flags (See note 2)	13 (D) Length of Time-Slice

Notes:

1. Time-slice length originally set in milliseconds, then converted by NIP to 26-microsecond units.
2. TSCE Flags.

   1... .... Last TSCE.
   .xxx xxxx Reserved bits.

UNIT CONTROL BLOCK (UCB)

M65MP PREFIX

-4	-3	-1
UCBFL3 M65MP Flags (See note 1)	Reserved	M65MP Flags (See note 2)

COMMON SEGMENT

0 (0)	1 (1)	2 (2)	3 (3)
SRTEJBNR Internal Job No. (See note 3)	SRTECHAN Allocation Channel Mask	UCBID Identifier	SRTESTAT Status Byte A (See note 4)
4 (4) UCBCHA Channel Address (See note 5)	5 (5) UCBUA Unit Address	6 (6) UCBFL1 Flag Byte 1 (See note 6)	7 (7) UCBDTI Index to Device Table
8 (8) UCBETI Error Routine Key Zoned No.	9 (9) UCBSTI X'10' = Statistics Table Index	10 (A) UCBLCI Channel Table Index	11 (B) UCBATI Attention Table Index
12 (C) UCBWGT Flags and Mask (See note 7)	13 (D) UCBNAME Unit Name		
16 (10) UCBTYP Device Type (See note 8)			
20 (14) UCBLTS Last Request Element		22 (16) UCBSNS Sense Information	

DEVICE - VARIABLE SEGMENT UCS

24 (18) UCBUCSID UCS Image Name	
28 (1C) UCBUCSOP UCS Image Format (See note 9)	29 (1D) Reserved 31 (1F)

Graphic Device

24 (18) Additional Sense Information	26 (1A) Use Count	27 (1B) (GCB) Control Byte
28 (1C) Task Entry Address		
32 (20) Restart Address		
36 (24) Device Index	37 (25) Buffer Table Address 39 (27)	

UCB (Continued)

Notes:

1. UCBFL3 — Model 65 multiprocessing flags.

Byte 1

0...	No alternate control units exist.
1...	Alternate control units exist.
...1	CPU A uses an HIO instruction for this device.
..1.	CPU B uses an HIO instruction for this device.
.... 0...	CPU A last used an SIO instruction for this device.
.... 1...	CPU B last used an SIO instruction for this device.
.... ..1.	CPU B has no path to this device.
....1	CPU A has no path to this device.
.x.. .x..	Reserved bits.

Bytes 2-3 — Reserved.

2. M65MP flags.

.... ..1.	One-bit switch used by processing modules (always 0 on exit.)
....0	Device on-line at IPL.
....1	Device off-line at IPL.

3. SRTEJBNR — Internal job identification.

xxxx	Job protection key - set if the mounted volume is to be retained or is to contain a passed data set.
.... 00..	Zeros.
.... ..1.	Set during device allocation if the volume is to be demounted and is retained or contains a passed data set. Causes job name in demount message.
....1	Set during device allocation if the volume to be mounted is to be retained or is to contain a passed data set.

Notes:

4. SRTESTAT — Status byte A

	Nonconsole devices and console device without MCS:
0...	Device is off-line.
1...	Device is on-line.
11..	Device status is to be changed from on-line to off-line, and either allocation is enqueued on devices or the device is allocated.
.1..	Device status is to be changed from on-line to off-line.
..1.	The mount status of the volume on this device is reserved.
...1	UNLOAD operator command has been addressed to this device; the device is not yet unloaded.
.... 1...	Device is allocated.
.... .1..	The mount status of the volume on this device is permanently resident.
.... ..1.	One of the following: System residence device. Primary console.
....1	One of the following: Standard labels have been verified for this tape volume. This is an alternate console.
	Console devices with MCS - Status during execution of a vary command:
10.. 0.01	Device status is to be changed from on-line unallocated to on-line active console, and allocation is enqueued on devices.
10.. 0.11	Device status is to be changed from on-line active console to on-line.
10.. 1.01	Device status is to be changed from on-line allocated to on-line active console. The status will be changed when the device is no longer allocated.
11.. 0.00	Device status is to be changed from on-line unallocated to off-line, and allocation is enqueued on the device.
11.. 1.00	Device status is to be changed from on-line allocated to off-line.
11.. 0.11	Device status is to be changed from on-line active console to off-line.
	Console devices with MCS - Status after execution of a vary command:
00.. 0.00	Device is off-line.
10.. 0.00	Device is on-line and unallocated.
10.. 1.00	Device is on-line and allocated.
10.. 0.10	Device is an on-line active console.

Notes:

5.	UCBCHA	Channel address.
	1...	Halt I/O.
	.1..	Status modifier.
	..xx x...	Reserved bits.
	xxx	Channel address - binary number.
6.	UCBFL1	Flag byte 1.
	1...	Busy - device status.
	.1..	Not ready - device status.
	..x.	Post flag:
	..0.	No channel program is being executed using this device.
	..1.	A channel program using this device has not yet been posted as having completed.
	...1	After a channel-end status a separate device-end status occurred with an error indication. (IOB-intercept flag.)
	.... 1...	Busy - control unit status.
	.... .xx.	Direct-access storage devices:
	.... .01.	Stand-alone channel program of I/O supervisor is being or was executed (arm seeking).
	.... .11.	User's channel program is being executed (data transfer).
		Telecommunications devices:
	.... .01.	Inhibit HIO instruction because the line is in receive status.
	1	I/O error routine is in control of this device. No other I/O operations are permitted on this device.
7.	UCBWGT	Flags and channel mask.
	1...	SYSIN.
	.1..	SYSOUT.
	..1.	Assumed that this device is to be allocated for a public volume request.
	...1	Rewind command has been addressed to this magnetic device by I/O support.
	 xxxx	I/O supervisor path mask (used where there are two or more paths to a device):
	.... 1...	Primary path to the device is inoperative.
	.... .1..	Optional path 1 to the device is inoperative.
	.... ..1.	Optional path 2 to the device is inoperative.
	1	Optional path 3 to the device is inoperative.

8.

UCBTYP				
Byte 1		Byte 2	Byte 3	Byte 4
IOS Flags	Model Code	Optional Features	Device Class	Unit Type
Bit 0 Reserved 1 Over-runable 2 1 Burst 0 Byte 3 Data Chain	Bit 1442/2520 7-0 Read/Punch 1 Punch Only	Bit 0 - UCS 1-6 - Reserved 7 - Card Image	X'08' Unit Record	Hex 01 2540 Card Reader. 02 2540 Card Punch. 03 1442 Card Read Punch. 04 2501 Card Reader. 05 2520 Card Read Punch. 08 1403 Printer (models N1,2,3,7) and 1404 Printer (continuous form support only). 0A 1443 Printer (model N1 only). 10 2671 Paper Tape Reader. 18 2495 Tape Cartridge Reader. 1A 1285 Optical Reader. 1B 1287 Optical Reader. 1C 1288 Optical Reader. 1D 1419 Primary Control Unit. 1E 1419 or 1275 Secondary Control Unit. 1F 1275 Primary Control Unit. 20 1052 Printer-Keyboard. 21 2150 Console.
Bit 0 Reserved 1 Over-runable 2 1 Burst 0 Byte 3 Data Chain	Bit 4,6,7-Reserved 5 - PE	Bit 0 - 7-track 1 - Data Convrt 2 - Dual Density 3-7 - Reserved	X'80' Magnetic Tape	Hex 01 2400

UCBTYP				
Byte 1		Byte 2	Byte 3	Byte 4
IOS Flags	Model Code	Optional Features	Device Class	Unit Type
Bit 0 Reserved 1 Over-runable 2 1 Burst 0 Byte 3 Data Chain	Bit 4-7 - 0000	Bit 0 - Scan 1 - Track Overflow 2 - Sharable Between Two or More CPU's	X'20' Direct Access	Hex 01 2311 02 2301 03 2303 04 2302 05 2321 08 2314
Refer to Systems Reference Library, IBM S/360 Operation System, System Control Blocks, GC28-6628	Refer to Systems Reference Library, IBM S/360 Operation System, System Control Blocks, GC28-6628	Refer to Systems Reference Library, IBM S/360 Operation System, System Control Blocks, GC28-6628	X'10' Display	Hex 02 2250 03 2260 04 1053 05 2280 06 2282 07 Mod 85 Console
Bit 0 Reserved 1 Over-runable 2 1 Burst 0 Byte 3 Data Chain	Hex X1 1050 1030 83B3 TWX WTTA 2260 X2 1060 115A X3 X4 2740 X5 2741C BSC1 X6 2741P BSC2 X7 BSC3	Bit 0 Auto Call 1 Auto Poll 2 Checking (2740 only) (Dual Communication Interface 2701 SDA-II) 3 Automatic Answering 4,5 10 - Station Control (2740 only) 01 - Transmit Control (2740 only) (Dual Code 2701 SDA-II) 11 - Optical Image Unit (2760 only)	X'40' Communications	Hex 1X IBM Type I 2X IBM Type II 3X IBM TTY 4X TTY Type I 5X TTY Type II 6X WTTA 7X Synch Type I 8X IBM Type III 9X Synch Type II X1 2702 X2 2701 X3 2703

BSC1 is nonswitched point-to-point.
BSC2 is switched point-to-point.
BSC3 is nonswitched multipoint.

9. UCBUCSOP — Format of the UCS image in the buffer.

1... .... — UCS image is the default image.
.1.. .... — UCS image is in the fold mode.
..xx xxxx — Reserved bits.

UCB TAPE CARTRIDGE READER (2495)

24 (18)
UCBCRWKA Address of the Tape Cartridge Reader UCB Extension

OPTICAL READER (1285, 1287, 1288)

24 (18)
UCBCRWKA Address of the Optical Reader Extension

MAGNETIC TAPE

24 (18)		
Additional Sense Information		
28 (1C) SRTEVOLI Volume Serial No.		
	34 (22) SRTESTAB Status Byte B (See note 1)	35 (23) SRTEDMCT Vol M Sw, DCB Count (See note 2)
36 (24) SRTEFSCT Sequence Count	38 (26) SRTEFSEQ Sequence No.	
40 (28) Message ID's or Data Set Serial Number		
	46 (2E) Reserved	
48 (30) UCBVOPT Option Bits (See note 3)	49 (31) UCBXTN Address of the Magnetic Tape Extension	

Notes:

1. SRTESTAB — Status byte B - volume status.

x...	Volume sharability:
0...	Sharable.
1...	Not sharable.
..1.	Additional volume label processing.
...1	Private - volume use status.
.... 1...	Public - volume use status.
....1	If MCS, demount or mount messages at offset 40-45. OPEN deletes the messages and turns this bit off.
.x.. .xx.	Reserved bits.

2. SRTEDMCT

	Any scheduler:
0...	No volume has been mounted.
1...	Volume mounted; no volume processing performed.
	SL open routine:
1...	Label not standard or serial; not correct.
0...	Standard label and correct serial verified.
1...	NSL open routine:
0...	Label not standard.
	Processing program:
	Nonstandard label verified.
1...	NL open routine:
0...	Standard label found.
0...	No standard label found.
	BLP open routine:
.xxx xxxx	Volume label has not been processed.
	Number of DCB's open for this volume.

3. UCBVOPT — Volume statistics option bits.

00..	Neither error volume analysis (EVA) nor error Statistics by volume (ESV) records kept.
01..	Only EVA records kept.
110.	ESV, or ESV and EVA records kept; ESV records sent to SYS1.MAN (X or Y) data set.
111.	ESV, or ESV and EVA records kept; ESV records sent to console.
...1	An error recovery procedure has control.
.... 1...	An ESV record has been issued for this volume because of an EOV condition.

Comments:

DIRECT ACCESS STORAGE DEVICE (EXCEPT DATA CELL DRIVE)

24 (18) Additional Sense Information		
28 (1C) SRTEVOLI Volume Serial No.		
	34 (22) SRTESTAB Status Byte B (See note 1)	35 (23) SRTEDMCT No. of DCB's Open
36 (24) SRTEFSCT Relative Address of VTOC		
40 (28) UCBSQC RESERVE Count for Shared DASD	41 (29) UCBDVRES Device Reservation Indicator	42 (2A) UCBRQESV Address of RQE
44 (2C) UCBFL4 (See note 2)	45 (2D) UCBORSV Address of the DEB	
48 (30) UCBSKA Direct-Access Address of Last Seek		
56 (38) SRTEUSER No. of Users	57 (39) SRTEECBA Direct-Access ECB Address	
60 (3C) Address of the Direct-Access UCB Extension 63 (3F)		

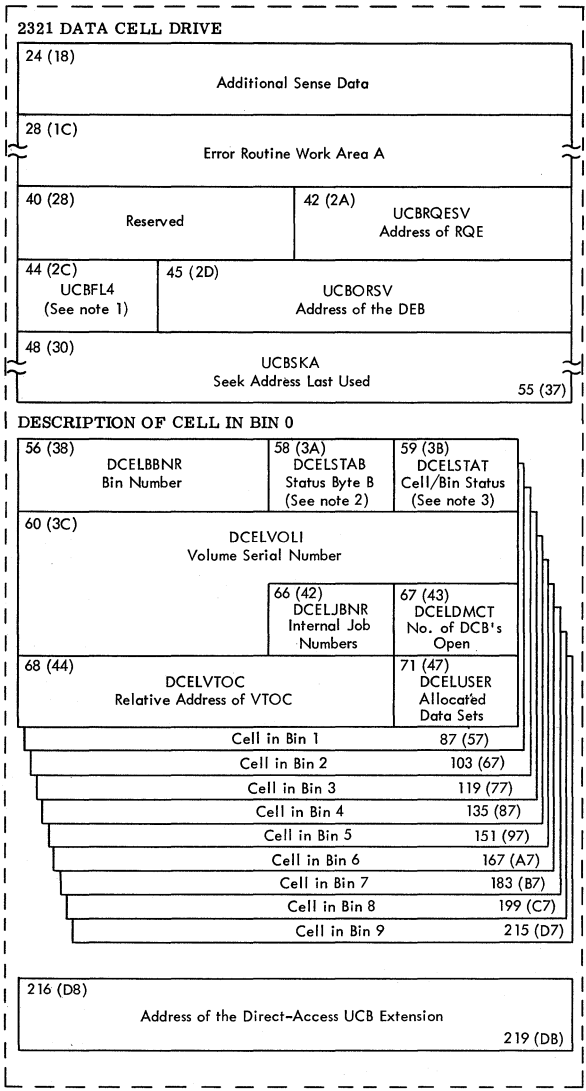
Notes:

1. SRTESTAB — Status byte B - volume status.

x...	Volume sharability:
0...	Sharable.
1...	Not sharable.
.xx.	Reserved bits.
...1	Private - volume use status.
.... 1...	Public - volume use status.
.... .1..	Storage - volume use status.
.... ..1.	Joblib data set is on this volume.
....1	Control volume - a catalog data set is on this volume.

2. UCBFL4 — Flag byte.

1...	Mount request issued.
.1..	Volume serial verification routine is in control.
..1.	First entry of volume serial verification routine.
...1	Label on alternate track; alternate track procedure in progress.
.... 1...	Volume verified.
.... .xxx	Number of requests for device from first user on the queue.


2321 DATA CELL DRIVE
24 (18)
Additional Sense Data
28 (1C)
Error Routine Work Area A
40 (28)
Reserved
42 (2A)
UCBRQESV
Address of RQE
44 (2C)
UCBFL4
(See note 1)
45 (2D)
UCBORSV
Address of the DEB
48 (30)
UCBSKA
Seek Address Last Used
55 (37)
DESCRIPTION OF CELL IN BIN 0
56 (38)
DCELBBNR
Bin Number
58 (3A)
DCELSTAB
Status Byte B
(See note 2)
59 (3B)
DCELSTAT
Cell/Bin Status
(See note 3)
60 (3C)
DCELVOLI
Volume Serial Number
66 (42)
DCELJBNR
Internal Job
Numbers
67 (43)
DCELDMCT
No. of DCB's
Open
68 (44)
DCELVTOC
Relative Address of VTOC
71 (47)
DCELUSER
Allocated
Data Sets
Cell in Bin 1
87 (57)
Cell in Bin 2
103 (67)
Cell in Bin 3
119 (77)
Cell in Bin 4
135 (87)
Cell in Bin 5
151 (97)
Cell in Bin 6
167 (A7)
Cell in Bin 7
183 (B7)
Cell in Bin 8
199 (C7)
Cell in Bin 9
215 (D7)
216 (D8)
Address of the Direct-Access UCB Extension
219 (DB)

DIRECT ACCESS UCB EXTENSION -
NOT CONTIGUOUS TO THE UCB PROPER

+104 (68) Error Recovery Work Area (The first valid field of this extension is at offset 104)
+144 (90) Overflow Work Area (Present When Overflow Specified)
+183 (B7)

2495 UCB EXTENSION - NOT CONTIGUOUS TO THE UCB PROPER

0 (0) Retry CCW1
8 (8) Retry CCW2
16 (10) Retry CCW3
24 (18) CSW Save Area

OPTICAL READER - UCB EXTENSION - NOT CONTIGUOUS TO UCB

0 (0) Data Chk Counter	1 (1) Incorrect Length Counter	2 (2) Equipment Check Counter	3 (3) Reserved
4 (4) Reserved			

MAGNETIC TAPE - UCB EXTENSION -
NOT CONTIGUOUS TO THE UCB

0 (0) UCBROR CCW for Read-Opposite Recovery			
8 (8) UCBSUM (See note 4)		10 (A) UCBTRT Read Threshold	11 (B) UCBTWT Write Threshold
12 (C) UCBTR Temporary Read Errors	13 (D) UCBTW Temporary Write Errors	14 (E) UCBSIO No. of Start I/O Operations	
16 (10) UCBPR Permanent Read Errors	17 (11) UCBPW Permanent Write Errors	18 (12) UCBNB No. of Noise Blocks	19 (13) Reserved
20 (14) UCBERG No. of Erase Gaps		22 (16) UCBCLN No. of Cleaner Actions	

MAGNETIC TAPE - UCB EXTENSION - NOT CONTIGUOUS TO THE UCB

Notes:

1. UCBFL4 — A flag byte.

1...	Mount request issued.
.1..	Volume serial verification routine is in control.
..1.	First entry of volume serial verification routine.
...1	Label on alternate track; alternate track procedure in progress.
.... 1...	Volume verified.
.... .xxx	Number of requests for device from first user on the queue.

2. DCELSTAB — Status byte B - volume status.

x...	Volume sharability:
0...	Sharable.
1...	Not sharable.
.xx.	Reserved bits.
...1	Private - volume use status.
.... 1...	Public - volume user status.
.... .1..	Storage - volume use status.
.... ..1.	Joblib data set is on this volume.
....1	Control volume; catalog on this volume.

3. DCELSTAT — Cell/bin status.

1...	Bin on-line; normal cell mounted.
0...	Bin off-line or a ballast cell mounted.
.1..	Reserved bits.
..1.	Reserved; mount status is reserved.
...1	UNLOAD; bin not yet unloaded.
.... 1...	Bin is allocated.
.... .1..	Permanently resident.

4. UCBSUM — Volume statistics update mask.

Byte 1

1...	Update temporary read errors.
.1..	Update temporary write errors.
..00	Start I/O counter position.
.... 1...	Update permanent read errors.
.... .1..	Update permanent write errors.
.... ..1.	Update noise blocks counter.
....x	Reserved bit.

Byte 2

00..	Erase gap counter position.
..00	Cleaner action counter position.
.... xxxx	Reserved bits.

DATA CONTROL BLOCK

DCB - SAM (Pointed to by DEB)

DEVICE INTERFACE SEGMENT

Direct-Access Storage Devices

0 (0)			
DCBRELAD PDS: TTRN of Member SYS1.LOGREC: Address of Parameter Table			
4 (4) DCBKEYCN Keyed Block Constant	5 (5)		
DCBFDAD Full Direct-Access Address			
	13 (D)		
	DCBDVTBL Address of Device Table Entry		
16 (10) DCBKEYLE Key Length	17 (11) DCBDEVT Device Type (see note 1)	18 (12) DCBTRBAL Bytes Left in Current Track	19 (13)

Magnetic Tape

0 (0)			
Reserved			
12 (C)			
DCBBLKCT Block Count			
16 (10) DCBTRTCH Tape Recording Technique (see note 2)	17 (11) DCBDEVT Device Type X'81' = 2400	18 (12) DCBDEN Tape Density (see note 3)	19 (13) Reserved

Paper Tape

8 (8) DCBLCTBL Translate Table Address			
12 (C) Reserved			
16 (10) DCBCODE Paper Tape Code (see note 4)	17 (11) DCBDEVT Device Type X'50' = 2671	18 (12) Reserved	19 (13) Paper Tape Flags (see note 5) 19 (13)

Card Reader, Card Punch

16 (10) DCBMODE, DCBSTACK Code, Stacker (see note 6)	17 (11) DCBDEVT Device Type (see note 7)	18 (12) Reserved 19 (13)

Printer

16 (10) DCBPRTSP Spacing (see note 8)	17 (11) DCBDEVT Device Type (see note 9)	18 (12) (PRTOV Mask) Overflow Mask (see note 10)	19 (13) Reserved

Notes:

1. DCBDEVT — Device type

0010 0001	2311 Disk Drive.
0010 0010	2301 Parallel Drum.
0010 0011	2303 Serial Drum.
0010 0100	2302 Disk Storage.
0010 0101	2321 Data Cell Drive.
0010 1000	2314 Disk Storage Facility.

2. DCBTRTCH — Tape recording technique for 7-track tape.

	Code	
0010 0011	E	Even parity.
0011 1011	T	BCD/EBCDIC translation.
0001 0011	C	Data conversion.
0010 1011	ET	Even parity and translation.

Notes:

3. DCBDEN — Tape density - 2400 Series magnetic tape units.

	Code	7-tracks	9-tracks
0000 0011	0	200 bpi	-
0100 0011	1	556 bpi	-
1000 0011	2	800 bpi	800 bpi
1100 0011	3	-	1600 bpi

4. DCBCODE — Paper tape code being used. The appropriate translate table is made available.

	Code	
1000 0000	N	No conversion.
0100 0000	I	IBM BCD.
0010 0000	F	Friden.
0001 0000	B	Burroughs.
0000 1000	C	National Cash Register.
0000 0100	A	ASCII (8-track).
0000 0010	T	Teletype.

5. Paper tape flags.

xxx.	Reserved bits.
...1	Invalid character in last record read.
.... 1...	End-of-record character reached in translation.
.... .1..	End-of-record character detected during READ.
.... ..1.	Uppercase translate.
.... ..0.	Lowercase translate.
....1	Error detected on READ.

6. DCBMODE, DCBSTACK

	Code	
xxxx		Mode of operation for 1442 Card Read Punch:
1000	C	Column binary mode.
0100	E	EBCDIC mode.
.... xxxx		Stacker selection:
.... 0001	1	Stacker 1.
.... 0010	2	Stacker 2.

7. DCBDEVT — Device type.

0100 0011	1442 Card Read Punch.
0100 0001	2540 Card Reader.
0100 0010	2540 Card Punch.
0100 0100	2501 Card Reader.
0100 0101	2520 Card Read Punch.

Notes:

8. DCBPRTSP — Number indicating normal printer spacing.

	Code	
0000 0001	0	No spacing.
0000 1001	1	Space one line.
0001 0001	2	Space two lines.
0001 1001	3	Space three lines.

9. DCBDEVT — Device type.

0100 1000	1403 Printer and 1404 Printer (continuous form support only).
0100 1010	1443 Printer.

10. Test-for-printer overflow mask (PRTOV mask)

	Code	
0010 0000	9	Test for Channel 9 overflow.
0001 0000	12	Test for Channel 12 overflow.

1419/1275

Before OPEN	
0 (0)	DCBSSID
Stacker Select Routine Name	

After OPEN			
0 (0) Reserved	DCBWTOID - WTO Identification Number (MCS Support) PCI MICB Address (After First READ)		
4 (4) Reserved	DCBSSAD Address of User's Stacker Select Routine		
8 (8) DCBMRFG (see note 1)	DCBIMAGE Address of User's Image Address Area		
12 (C) DCBMRIND (see note 2)	DCBECBLT Address of ECB List		
16 (10) DCBMRFLG Flag Byte (see note 3)	17 (11) DCBDEVT Device Type (see note 4)	18 (12) DCBAPPIN Situation Indicator for Appendage	19 (13) Reserved

OPTICAL READER

0 (0) Reserved	1 (1) DCBWTOID WTO Identification Number (MCS Support)		
4 (4) Reserved	5 (5) DCBERRCN Address of Optical Reader Error Counters		
8 (8) Reserved	9 (9) DCBDSPLY address Address of DSPLY Module		
12 (C) Reserved	13 (D) DCBRDLNE/DCBRESCN Address of RDLNE or RESCN Module		
16 (10) DCBORBYT Access Method Work Area (see note 5)	17 (11) DCBDEVT Device Type (see note 6)	18 (12) DCBEIB Optical Reader Error Indicator Byte (see note 7)	19 (13) Reserved

Notes:

1. DCBMRFG — Buffer indicator.

xx..	A binary counter that indicates into which buffer status information is to be posted.
..xx xxxx	Reserved bits.

2. DCBMRIND — Indicator and counter byte.

xxx.	A binary counter of the number of documents read after disengage.
...1	DCB was altered when SYNAD routine was entered due to secondary control unit (SCU) error.
.... 1...	Pocket light has been turned on.
.... .1..	Pocket light 0-6 is being set on.
.... ..1.	Error recovery procedure (ERP) is executing for the primary control unit (PCU).
....1	Error recovery procedure (ERP) is executing for the secondary control unit (SCU).

3. DCBMRFLG — Flag byte.

1...	First or second secondary control unit (SCU) command chain is being used.
.1..	Debugging mode in use.
..1.	Disengage requested by the user.
...1	Disengage requested.
.... xx..	A binary counter indicating first, second, or third primary control unit (PCU) command chain is being used.
.... ..1.	A Write-to-Operator (WTO) message must be deleted.
....1	Unit exception.

Notes:

4. DCBDEVT — Device type.

0101 1101	1419 Magnetic Character Reader.
0101 1111	1275 Optical Reader Sorter.

5. DCBORBYT — Optical reader byte used by BSAM/QSAM.

1...	SYNAD in control
.1..	End of file (EOF).
..1.	Buffers primed (QSAM).
...x xxxx	Reserved bits.

6. DCBDEVT — Device type.

0101 1010	1285 Optical Reader.
0101 1011	1287 Optical Reader.
0101 1100	1288 Optical Reader.

7. DCBEIB — Error indicator byte.

.1..	1287 or 1288 unable to locate reference mark.
..1.	1287: A stacker-select command was given after the allotted time had elapsed. The document has been put in the reject pocket. 1288 unformatted only: End-of-page has occurred.
...1	A nonrecoverable error has occurred.
.... 1...	An equipment check resulted in an incomplete READ.
.... .1..	A wrong-length record condition has occurred.
.... ..1.	QSAM: The operator entered characters from keyboard. BSAM: A hopper-empty condition has occurred.
....1	A data check has occurred.
x...	Reserved bit.

COMMON INTERFACE

20 (14) DCBBUFNO Number of Buffers	21 (15) DCBBUFCB Address of Buffer Pool Control Block	
24 (18) DCBBUFL Buffer Length		26 (1A) DCBDSORG Data Set Organization (see note 1)
28 (1C) DCBIOBAD FLAGS (note 2)	29 (1D) DCBIOBAD Address of IOB Prefix When Chained Scheduling is Used or When 1419/1275 is Used QSAM: Address of the old DEB (note 2) 31 (1F)	

FOUNDATION EXTENSION

32 (20)	33 (21)
DCBHIARC, DCBFTEK, DCBBFALN (see note 3)	DCBEODAD Address of User's EOF Routine
36 (24) DCBRECFM Record Format (see note 4)	37 (25) DCBEXLST Address of User's Exit List 39 (27)

Notes:

1. DCBDSORG — Data set organization to be used.

Byte 1

	Code	
1...	IS	Indexed sequential organization.
.1..	PS	Physical sequential organization.
..1.	DA	Direct organization.
...x xx..		Reserved bits.
.... ..1.	PO	Partitioned organization.
....1	U	Unmovable.

Byte 2

1...	GS	Graphics organization.
.xxx xxxx		Reserved bits.

2. DCBIOBAD

Byte 1

1...	Only one device allocated to this data set.
.1..	Update complete, free old DEB.
..10	Update to take place.
..11	No update to take place.
..01	Old DEB address must be saved.

Bytes 2-3 — Address of old DEB.

3. DCBBFALN
DCBBFTEK
DCBHIARC

	Code
x... .x..	Buffer pool location:
0... .1..	Hierarchy 0 main storage.
1... .0..	Hierarchy 1 main storage.
.xxx	Buffering technique:
.110	Logical record interface for QSAM Locate.
.010	Track overflow for BDAM access.
.100	Simple buffering.
.001	Exchange buffering.
.... x...	Reserved bit.
.... ..xx	Buffer alignment:
.... ..10	Doubleword boundary.
.... ..01	Fullword, not a doubleword, coded in DCB.
.... ..11	Fullword, not a doubleword coded in DD.

Notes:

4. DCBRECFM — Record format.

	Code	
10..	F	Fixed record length.
01..	V	Variable record length.
11..	U	Undefined record length.
..1.	T	Track overflow.
...1	B	Blocked records.
.... 1...	S	Fixed-length record format: Standard blocks. Variable-length record format: Spanned records.
.... .10.	A	ASA control character.
.... .01.	M	Machine control character.
.... .00.		No control character.
....1		KEYLEN specified in DCB macro.

FOUNDATION

Before OPEN

40 (28)		
DCBDDNAM DD Statement Name		
48 (30) DCBOFLGS Flags for OPEN (see note 1)	49 (31) DCBIFLG Error Flags for IOS (see note 2)	50 (32) DCBMACR Type of I/O Macro-instruction and Options (see note 3) 51 (33)

After OPEN

40 (28)		42 (2A)
DCBTIOT Offset to DD Entry in TIOT		DCBMACRF Type of I/O Macro-instruction and Options (see note 3)
44 (2C) DCBIFLGS Error Flags for IOS (see note 2)	45 (2D) DCBDEBAD Address of DEB	
48 (30) DCBOFLGS Flags for OPEN (see note 1)		

Notes:

1. DCBOFLGS — Flags used by the open routine.

1...	Last I/O operation was a WRITE.
0...	Last I/O operation was a READ or POINT.
.1..	Last I/O operation was in read-backward mode.
..1.	Close routine for concatenation.
...1	OPEN
.... 1...	Problem program concatenation.
.... .1..	Tape mark read.
.... ..0.	User exit taken.
.... ..1.	Return from user exit.
....1	DCB to be processed.

2. DCBIFLG — Used by I/O supervisor in communicating error conditions and in determining corrective procedures.

00..	Not in error procedure.
01..	Error correction in process.
11..	Permanent error condition.
..10	Channel 9 printer carriage tape punch sensed.
..01	Channel 12 printer carriage tape punch sensed.
.... 00..	Always use I/O supervisor error routine.
.... 11..	Never use I/O supervisor error routine.
.... 01..	Never use I/O supervisor error routine.
.... 10..	Never use I/O supervisor error routine.
.... ..xx	Reserved bits.

3. DCBMACRF

Byte 1 — EXCP access method.

Code	
1...	Execute Channel Program (EXCP).
.1..	Foundation extension present with EXCP.
..1.	Appendages required with EXCP.
...1	Common interface present with EXCP.
.... 1...	Block count is accurate.
.... .xxx	Reserved bits.

Byte 2

xxxx	Reserved bits.
.... 1...	Five-word device interface present with EXCP.
.... .1..	Four-word device interface present with EXCP.
.... ..1.	Three-word device interface present with EXCP.
....1	One-word device interface present with EXCP.

Byte 1 — BSAM - Input.

00..		Always zero for BSAM.
..1.	R	READ.
...x x..x		Reserved bits.
.... .1..	P	POINT (implies NOTE).
.... ..1.	C	CNTRL 0.

Notes:

Byte 2 — BSAM - Output.

	Code	
00..		Always zero for BSAM.
..1.	W	WRITE.
.... 1...	L	Load mode BSAM (create BDAM data set).
.... .1..	P	POINT (implies NOTE).
.... ..1.	C	CNTRL.
....1		A user-provided segment work area for a create BDAM format VS data set is present.
...x		Reserved bit.

Byte 1 — QSAM - Input.

0...		Always zero for QSAM.
.1..	G	GET.
..0.		Always zero for QSAM.
...1	M	Move mode.
.... 1...	L	Locate mode.
.... .1..	T	Substitute mode.
.... ..1.	C	CNTRL.
....1	D	Data mode.

Byte 2 — QSAM - Output.

0...		Always zero for QSAM.
.1..	P	PUT
..0.		Always zero for QSAM.
...1	M	Move mode.
.... 1...	L	Locate mode.
.... .1..	T	Substitute mode.
.... ..1.	C	CNTRL.
....1	D	Data mode.

Byte 1 — BPAM - Input.

00..		Always zero for BPAM.
..1.	R	READ.
.... .1..	P	POINT (implies NOTE).
...x x.xx		Reserved bits.

Byte 2 — BPAM - Output.

00..		Always zero for BPAM.
..1.	W	WRITE.
.... .1..	P	POINT (implies NOTE).
...x x.xx		Reserved bits.

Byte 1 — BISAM.

00.0 0...		Always zero for BISAM.
..1.	R	READ.
.... .1..	S	Dynamic buffering.
.... ..1.	C	CHECK.
....x		Reserved bit.

Byte 2 — BISAM

00.0 0000		Always zero for BISAM.
..1.	W	WRITE.

Notes:

Byte 1	Code	QISAM
0.0. .0..		Always zero for QISAM.
.1..	G	GET.
...1	M	Move mode of GET.
.... 1...	L	Locate mode for GET.
.... ..xx		Reserved bits.

Byte 2		QISAM
1...	S	SETL.
.1..	P	PUT or PUTX.
..0.		Always zero for QISAM.
...1	M	Move mode of PUT.
.... 1...	L	Locate mode of PUT.
.... .1..	U	Update in place (PUTX).
.... ..1.	K	SETL by key.
....1	I	SETL by ID.

Byte 1		BDAM
00..		Always zero for BDAM.
..1.	R	READ.
...1	K	Key segment with READ.
.... 1...	I	ID argument with READ.
.... .1..	S	System provides area for READ (dynamic buffering).
.... ..1.	X	Read exclusive.
....1	C	CHECK macroinstruction.

Byte 2		BDAM
00..		Always zero for BDAM.
..1.	W	WRITE.
...1	K	Key segment with WRITE.
.... 1...	I	ID argument with WRITE.
.... .x..		Reserved bit.
.... ..1.	A	Add type of WRITE.
....1		A user-provided segment work area for a format VS data set is present.

Comments:

ACCESS METHOD SEGMENTS

EXCP Access Method Interface

	49 (31) Reserved
52 (34) DCBOPTCD Option Codes (see note 1)	Reserved
60 (3C) DCBEOEA ID of End-of-Extent Appendage	62 (3E) DCBPCIA ID of Program-Controlled-Interruption Appendage
64 (40) DCBSIOA ID of SIO Appendage	66 (42) DCBCENDA ID of Channel-End Appendage
68 (44) DCBXENDA ID of Abnormal-End Appendage	70 (46) Reserved 71 (47)

BSAM, BPAM, Interface

	49 (31) DCBREAD, DCBWRITE Address of Read or Write Module		
52 (34) DCBOPTCD Option Codes (see note 2)	53 (35) DCBCHECK Address of Check Module		
56 (38) DCBIOBL IOB Length	57 (39) DCBSYNAD Address of User's Synchronous Error Routine		
60 (3C) DCBCIND1 Condition Flags (see note 3)	61 (3D) DCBCIND2 Condition Flags (see note 4)	62 (3E) DCBBLKSI Maximum Block Size	
64 (40) DCBWCPO Write Channel Program Offset	65 (41) DCBWCPL Write Channel Program Length	66 (42) DCBOFFSR Read CCW Offset	66 (43) DCBOFFSW Write CCW Offset

BSAM, BPAM, Interface (Cont'd)

68 (44) DCBIOBA Normal Scheduling: Address of IOB Prefix, Chained Scheduling: Address of ICB 1419/1275: Address of MICB	
72 (48) DCBNCP No. of Channel Programs	73 (49) DCBEOBR Address of Read End-of-Block Module
76 (4C) DCBEOBW Address of Write End-of-Block Module or of Segment Work Area Control Block	
80 (50) DCBDIRCT Directory Block Length	82 (52) DCBLRECL Logical Record Length
84 (54) DCBCNTRL, DCBNOTE, DCBPOINT Address of CNTRL or NOTE/POINT Module 87 (57)	

Notes:

1. DCBOPTCD — Option codes.

	Code	
xxxx x.xx		Reserved bits.
.... .1..	Z	For magnetic tape devices, use reduced error recovery procedure.

2. DCBOPTCD — Option codes.

	Code	
1...	W	Write-validity check (DASD).
.1..	U	Allow a data check caused by an invalid character (1403 Printer with UCS feature).
..1.	C	Chained scheduling using the program controlled interruption.
...1	H	Optical Reader: Hopper empty exit.
.... .1..	Z	For magnetic tape devices, use reduced error recovery procedure.
.... ..1.	T	User Totaling (BSAM only).
.... x..x		Reserved bits.

3. DCBCIND1 — Condition indicators.

1...	Track overflow in use.
.1..	Search direct.
..1.	End of volume - used by EOB routines.
...1	End of volume - used by channel-end appendage routines.
.... xxxx	Reserved bits.

Notes:

4. DCBCIND2 — Condition indicators.

1...	Partitioned data set: STOW has been performed. Sequential data set: Update.
.1..	Direct organization data set: Last I/O was a write-record zero. Sequential data set: UPDATE EOF is indicated.
..1.	PUT entered from CLOSE while in update mode (QSAM only).
...1	Permanent I/O error.
.... 1...	OPEN acquired buffer pool.
.... .1..	Chained scheduling being supported.
.... ..1.	FEOV bit.
....0	Always set to 0 for BSAM/BPAM.

Comments:

QSAM ACCESS METHOD INTERFACE

	49 (31) DCBGET, DCBPUT Address of GET or PUT Module		
52 (34) DCBOPTCD Option Codes (see note 1)	53 (35) DCBGERR, DCBPERR Address of Synchronizing Routine		
56 (38) DCBIOBL IOB Length	57 (39) DCBSYNAD Address of User's Synchronizing Routine		
60 (3C) DCBCIND1 Condition Flags (see note 2)	61 (3D) DCBCIND2 Condition Flags (see note 3)	62 (3E) DCBBLKSI Maximum Block Size	
64 (40) DCBWCPO Write Channel Program Offset	65 (41) DCBWCPL Write Channel Program Length	66 (42) DCBOFFSR Read CCW Offset	67 (43) DCBOFFSW Write CCW Offset
68 (44) DCBIOBA Address of IOB Prefix (when normal scheduling is used) Address of ICB (when chain scheduling is used)			
72 (48) DCBEOBAD, DCBLCCW Address of End of Buffer or of Last CCW in List			
76 (4C) (see note 5)	DCBRECAD, DCBCCCW Address of Current or Next Logical Record or CCW		
80 (50) X'01' If TRUNC Entry Point Entered DCBQSWS		82 (52) DCBLRECL Logical Record Length	
84 (54) DCBEROPT Error Option Flags (see note 4)	85 (55) DCBCNTRL Address of CNTRL		
88 (58) Reserved		90 (5A) DCBPRECL Physical Record Length	
92 (5C) DCBEOB Address of End-of-Block Module			95 (5F)

Notes:

1. DCBOPTCD — Option codes.

	Code	
1...	W	Write-validity check (DASD).
.1..	U	Allow a data check for an invalid character (1403 with UCS).
..1.	C	Chained scheduling using the program controlled interruption.
...1	O	Optical Reader: On-line correction.
.... .1..	Z	For magnetic tape devices, use reduced error recovery procedure.
.... ..1.	T	User Totaling.
.... x..x		Reserved bits.

2. DCBCIND1 — Condition indicators.

1...	Direct access: Track overflow in use. 2540 Card Punch: Data set opened but no data written.
.1..	Search direct.
..1.	End of volume - used by EOB routines.
...1	End of volume - used by channel-end appendage routines.
....1	Exchange buffering supported.
.... xxx.	Reserved bits.

3. DCBCIND2 — Condition indicators.

1...	STOW has been performed.
.1..	Last I/O was a write-record zero.
..1.	CLOSE in process.
...1	Permanent I/O error.
.... 1...	OPEN acquired buffer pool.
.... .1..	Chained scheduling supported.
.... ..1.	FEOV bit.
....1	This is a QSAM DCB.

4. DCBEROPT — Error option.

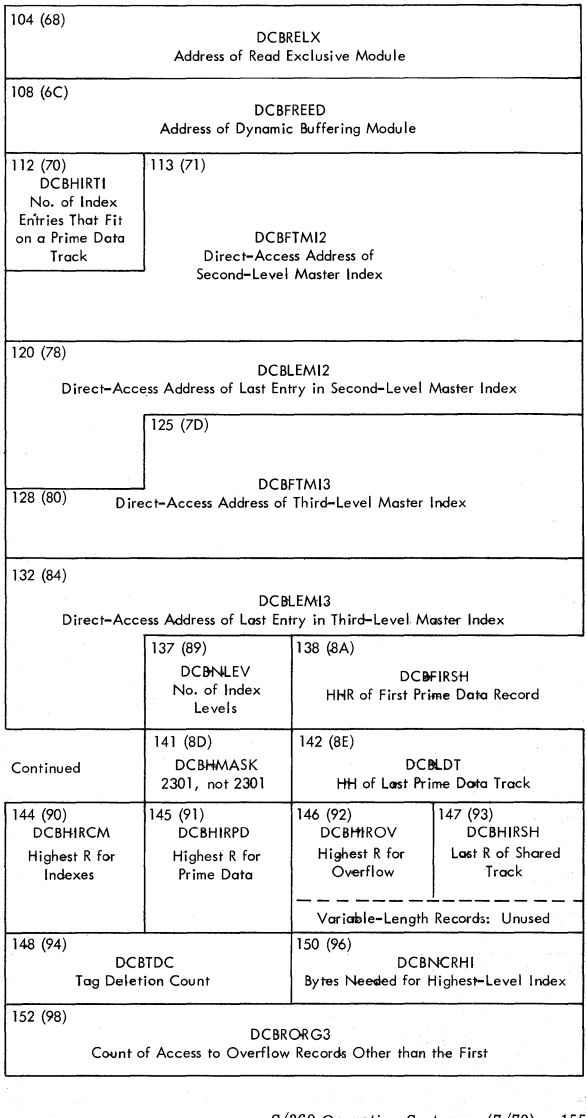
	Code	
1...	ACC	Accept.
.1..	SKP	Skip.
..1.	ABE	Abnormal end of task.
...x xxxx		Reserved bits.

5. DCBRECAD — Simple buffering (Spanned record format):

1000	TRUNC macro has been issued.
0100	First entry from OPEN for RECFM=VS.
1111	RELSE macro has been issued.

ACCESS METHODS INTERFACE-ISAM

	49 (31) DCBGET, DCBPUT Address of GET or PUT Module		
52 (34) DCBOPTCD Option Code (see note 1)	53 (35) DCBMAC DCBMACRF Overflow (see note 2)	54 (36) DCBNTM Index Size	55 (37) DCBCYLOF No. of Overflow Tracks
56 (38) DCBSYNAD Address of User's Synchronous Error Routine			
60 (3C) DCBRKP Relative Key Position		62 (3E) DCBBLKSI Block Size	
64 (40) DCBMSWA Address of Work Area			
68 (44) DCBSMSI Size of Area for Highest Level Index		70 (46) DCBSMSW Size of Work Area	
72 (48) DCBNCP No. of Channel Programs	73 (49) DCBMSHI Address of Area for Highest Level Index		
76 (4C) DCBSETL BISAM: Address of CHECK Module QISAM: Address of SETL Module			
80 (50) DCBEXCD1 Condition Flags (see note 3)	81 (51) DCBEXCD2 Condition Flags (see note 4)	82 (52) DCBLRECL Logical Record Length	
84 (54) DCBESETL Address of ESETL Routine			
88 (58) DCBLRAN Address of READ K or WRITE K or Read Exclusive Module			
92 (5C) DCBLWKN Address of WRITE KN Module			
96 (60) DCBRELSE Work Area for Register Contents			
100 (64) DCBPUTX Work Area for Register Contents			


104 (68)
DCBRELX
Address of Read Exclusive Module
108 (6C)
DCBFREED
Address of Dynamic Buffering Module
112 (70)
DCBHIRTI
No. of Index Entries That Fit on a Prime Data Track
113 (71)
DCBFTMI2
Direct-Access Address of Second-Level Master Index
120 (78)
DCBLEMI2
Direct-Access Address of Last Entry in Second-Level Master Index
125 (7D)
128 (80)
DCBFTMI3
Direct-Access Address of Third-Level Master Index
132 (84)
DCBLEMI3
Direct-Access Address of Last Entry in Third-Level Master Index
137 (89)
DCBNLEV
No. of Index Levels
138 (8A)
DCBFIRSH
HHR of First Prime Data Record
Continued
141 (8D)
DCBHMASK
2301, not 2301
142 (8E)
DCBLDT
HH of Last Prime Data Track
144 (90)
DCBHIRCM
Highest R for Indexes
145 (91)
DCBHIRPD
Highest R for Prime Data
146 (92)
DCBHIROV
Highest R for Overflow
147 (93)
DCBHIRSH
Last R of Shared Track
Variable-Length Records: Unused
148 (94)
DCBTDC
Tag Deletion Count
150 (96)
DCBNCRHI
Bytes Needed for Highest-Level Index
152 (98)
DCBRORG3
Count of Access to Overflow Records Other than the First

156 (9C)
DCBNREC
No. of Logical Records in Prime Data Area

160 (A0)
DCBST
Status Indicators (see note 5)

161 (A1)
DCBFTCI
Direct-Access Address of First Track of Cylinder Index

168 (A8)
DCBHIIOV
Fixed: Highest R for Independent Overflow Variable (not used)

169 (A9)
DCBFTMI1
Direct-Access Address of First Track of First-Level Master Index

176 (B0)
DCBNTHI
Size of Highest Index

177 (B1)
DCBFTHI
Direct-Access Address of First Track of Highest-Level Index

184 (B8)
DCBLPDA
Direct-Access Address of Last Prime Data Record in Prime Data Area

192 (C0)
DCBLETI
Direct-Access Address of Last Active Normal Entry of Track Index on Last Cylinder

197 (C5)
DCBOVDEV
(see note 6)

198 (C6)
DCBNBOV
No. of Bytes Left on Overflow Track

200 (C8)
DCBLECI
Direct-Access Address of Last Active Entry in Cylinder Index

205 (CD)
Reserved

206 (CE)
DCBRORG2
No. of Tracks Left in Overflow Area

208 (D0)
DCBLEMI1
Direct-Access Address of Last Active Entry in First-Level Master Index

213 (D5)
Reserved

214 (D6)
DCBNOREC
No. of Logical Records in Overflow Area

216 (D8) DCBLIOV Direct-Access Address of Last Record in Overflow Area	
224 (E0) DCBRORG1 No. of Full Cylinder Overflow Areas	226 (E2) Reserved
228 (E4) DCBWKPT1 Pointer to Work Area or Channel Program	
232 (E8) DCBWKPT2 Pointer to Work Area or Channel Program	
236 (EC) DCBWKPT3 Pointer to Work Area or Channel Program	
240 (F0) DCBWKPT4 Pointer to Work Area or Channel Program	
244 (F4) DCBWKPT5 Pointer to Work Area or Channel Program	
248 (F8) DCBWKPT6 Pointer to Work Area or Channel Program 251 (FB)	

Notes:

1. DCBOPTCD — Option codes.

	Code	
1...	W	Write-validity check.
.1..	U	Full-track index WRITE.
..1.	M	Master indexes.
...1	I	Independent overflow area.
.... 1...	Y	Cylinder overflow area.
.... ..1.	L	Delete option.
....1	R	Reorganization criteria.
.... .x..		Reserved bit.

2. DCBMAC — Extension of the DCBMACRF field for ISAM.

	Code	
xxxx ...x		Reserved bits.
.... 1...	U	Update for READ.
.... .1..	U	Update type of WRITE.
.... ..1.	A	Add type of WRITE.

Notes:

3. DCBEXCD1 — First byte in which exceptional conditions detected in processing data records are reported to the user.

1...	Lower key limit not found.
.1..	Invalid device address for lower limit.
..1.	Space not found.
...1	Invalid request.
.... 1...	Uncorrectable input error.
.... .1..	Uncorrectable output error.
.... ..1.	Block could not be reached (input).
....1	Block could not be reached (update).

4. DCBEXCD2 — Second byte in which exceptional conditions detected in processing data records are reported to the user.

1...	Sequence check.
.1..	Duplicate record.
..1.	DCB closed when error was detected.
...1	Overflow record.
.... 1...	PUT: length field of record larger than length indicated in DCBLRECL.
.... .xxx	Reserved bits.

5. DCBST — Status indicators.

1...	Single schedule mode.
.1..	Key sequence checking is to be performed.
..1.	Loading has been completed. Set to 1 by the close routine and to 0 by the first execution of the put routine.
...1	The extension of the data set begins on a new cylinder.
.... x...	Reserved bit.
.... .1..	First macroinstruction not yet received.
.... ..1.	Last block full.
....1	Last track full.

6. DCBOVDEV — Device type for independent overflow.

0000 0001	2311	Disk Drive.
0000 0010	2301	Parallel Drum.
0000 0011	2303	Serial Drum.
0000 0100	2302	Disk Storage.
0000 0101	2321	Data Cell Drive.
0000 1000	2314	Disk Storage Facility.

DCB -- BDAM INTERFACE

	49 (31) DCBREAD, DCBWRITE Address of Read or Write Module
52 (34) DCBOPTCD Option Codes (see note)	53 (35) DCBCHECK Address of Check Module
56 (38) DCBSYNAD Address of SYNAD Routine	
60 (3C) Reserved	62 (3E) DCBBLKSI Maximum Block Size
64 (40) DCBIOBSQ Address of First IOB on Unscheduled Queue	
68 (44) DCBSQND Address of Last IOB on Unscheduled Queue	
72 (48) DCBIOBUQ Address of First IOB on Unposted Queue	
76 (4C) DCBUQND Address of Last IOB on Unposted Queue	
80 (50) Reserved	81 (51) DCBLIMCT No. of Tracks/No. of Relative Blocks to be Searched
84 (54) DCBXCNT	85 (55) DCBXARG Address of Read Exclusive List
88 (58) DCBDRDX Address of Read Exclusive Module	
92 (5C) DCBDFOR Address of Format Module	
96 (60) DCBDFBK Address of Feedback Module	
100 (64) DCBDYNB Address of Dynamic Buffer Module or of the Segment Work Area	

Note:

DCBOPTCD Option Codes.

	Code	
1...	W	Write-validity check.
.1..		Track overflow.
..1.	E	Extended search.
...1	F	Feedback.
.... 1...	A	Actual addressing.
.... .1..		Dynamic buffering.
.... ..1.		Read exclusive.
....1	R	Relative block addressing.

DCB - QTAM

WTTA INTERFACE

16 (10) DCBBQFLG WTTA Flags (see note 1)	17 (11) DCBWTEOM EOM Character	18 (12) DCBWTEOT EOT Character	19 (13) DCBWTPAD No. of Padding Characters

DATA SET INTERFACE

Line Group

20 (14) DCBBUFRQ Buffers Requested	21 (15) DCBCLPS Address of the LPS Routine	
24 (18) DCBINTVL Intentional Interval	25 (19) DCBACLOC Offset	26 (1A) DCBDSORG Data Set Organization First Byte = X'10' is CX Line Group
28 (1C) DCBDEVTP Device Type	29 (1D) DCBIOBAD Address of First IOB	
32 (20) DCBCPRI Priority (see note 2)	33 (21) DCBLCBAD Base for Addressing LCB's	
36 (24) DCBEIOBX Size of the LCB	37 (25) DCBEXLST Address of the Exit List	39 (27)

Processing Program Message Queue

20 (14) DCBBUFRQ Buffers to be Filled	21 (15) DCBTRMAD Address of the Terminal Name	
24 (18) DCBSOWA Size of the Work Area		26 (1A) DCBDSORG Data Set Organization First Byte = X'04' is MQ (PP MSG Q)
28 (1C) DCBSEGAD Address of Current Segment		
32 (20) DCBEODAD Address of the EODAD Routine		
36 (24) DCBRECFM Record Format (see note 3)	37 (25) DCBEXLST Address of the Exit List	39 (27)

DASD Message Queue, Checkpoint

20 (14) DCBBUFNO Reserved	21 (15) DCBBUFCB Address of Terminal Table	
24 (18) DCBBUFL Length of the Data		26 (1A) DCBDSORG Data Set Organization First Byte = X'08' is CQ (DA MSG Q)
28 (1C) DCBIOBAD Address of the IOB		31 (1F)

Comments:

FOUNDATION

Before OPEN

40 (28) DCBDDNAM DD Statement Data Set Name		
48 (30) DCBOFLGS Open Routine Flags (see note 4)	49 (31) DCBIFLGS I/O Supervisor Flags (see note 5)	50 (32) DCBMACR Macroinstructions (see note 6) 51 (33)

After OPEN

40 (28) DCBTIOT Offset in TIOT Table to DD Entry		42 (2A) DCBMACRF Macroinstruction (see note 6)
44 (2C) DCBIFLGS I/O Supervisor Flags (see note 5)	45 (2D) DCBDRBAD Address of the DEB	
48 (30) DCBOFLGS Open Routine Flags (see note 4)	49 (31) DCBREAD, DCBWRITE, DCBGET, DCBPUT Address of the Access Modules 51 (33)	

EXTENSION

Line Group

52 (34) DCBKSTAT Error Threshold
56 (38) DCBCPOLL Polling List Origin First Byte = X'08' is WTTA 59 (3B)

DCBCPOLL
DCBCPOLL
DCBCPOLL

Processing Program Message Queue

52 (34) DCBRECRD Not Used
56 (38) DCBSYNAD Address of the SYNAD Routine
60 (3C) DCBEOBLK Not Used 63 (3F)

Notes:

1. DCBBQFLG — WTTA flag byte.

x... .xxx	Reserved bits.
.1..	WRU feature is to be used.
..1.	IAM feature is to be used.
...1	WRU feature is to be used in the Send Header subgroup.
.... 1...	WRU feature is to be used in the End Send subgroup.

2. DCBCPRI — Communication priority. Relative priority to be given to sending and receiving operations.

	Code	
xxxx x...		Reserved bits.
.... .1..	R	Receiving has priority.
.... ..1.	E	Receiving and sending have equal priority.
....1	S	Sending has priority.

3. DCBRECFM — Record format.

	Code	
0000 0010	R	Record.
0000 0100	G	Message.
0000 1000	S	Segment.

4. DCBOFLGS — Flags used by OPEN.

xxx. xxx.	Reserved bits.
...1	Opening has been successfully completed.
....1	This bit is set to 1 by an I/O support routine if the DCB is to be processed by that routine.

5. DCBIFLGS — Used by IOS in communicating error conditions and in determining error procedures.

00..	Not in error procedure.
01..	Error correction in process.
11..	Permanent error condition.
..10	Channel 9 printer carriage punch.
..01	Channel 12 printer carriage punch.
.... 00..	Always use IOS error routine.
.... 11..	Never use IOS error routine.
.... 10..	Never use IOS error routine.
.... 01..	Never use IOS error routine.
.... ..xx	Reserved bits.

6. DCBMACRF — Macroinstruction reference.

Byte 1

x..x xxxx	Reserved bits.
.1..	PUT for message queue.
..1.	WRITE for line group.

Byte 2

x..x xxxx	Reserved bits.
.1..	GET for message queue.
..1.	READ for line group.

DCB - BTAM

WTTA INTERFACE

16 (10) DCBBQFLG WTTA Flags (see note 1)	17 (11) DCBWTEOM EOM Character	18 (12) DCBWTEOT EOT Character	19 (13) DCBWTPAD Number of Padding Characters

Common Interface

20 (14) DCBBUFNO Number of Buffers	21 (15) DCBBUFCB Address of Buffer Pool Control Block	
24 (18) DCBBUFL Buffer Length		26 (1A) DCBDSORG Data Set Organization First Byte = X'10' is CX TP Line Group
28 (1C) DCBDEVTP Index to Device Entry in Device I/O Directory	29 (1D) DCBIOBAD Base for Addressing IOB's	

Foundation Extension

32 (20) DCBHIARC, DCBBFTEK Buffering Technique (see note 2)	33 (21) DCBBERROP Error Recovery Procedures (see note 3)	34 (22) DCBBUFCT Max Buffers (Dynamic Buffering)	35 (23) Reserved
36 (24) DCBEIOBX Size of IOB	37 (25) DCBEXLST Address of User-provided Exit List		

FOUNDATION

Foundation Before OPEN

40 (28) DCBDDNAM Name From DD Statement		
48 (30) DCBOFLGS Open Flags (see note 4)	49 (31) DCBIFLG IOS Error Flags (see note 5)	50 (32) DCBMACR Type of I/O Macroinstruction and Options (see note 6)

Foundation After OPEN

40 (28) DCBTIOT Offset to DD Entry in TIOT		42 (2A) DCBMACRF Type of I/O Macroinstruction and Options (see note 6)
44 (2C) DCBIFLGS IOS Error Flags (see note 5)	45 (2D) DCBDEBAD Address of DEB	
48 (30) DCBOFLGS Open Flags (see note 4)		

BTAM Interface

48 (30)	49 (31) DCBREAD, DCBWRITE Address of Read/Write Module
52 (34) DCBLERB Address of Line Error Block	

Notes:

1. DCBBQFLG — WTTA flag byte.

x..x xxxx	Reserved bits.
.1..	WRU feature to be used.
..1.	IAM feature to be used.

2. DCBHIARC, DCBBFTEK

	Code	
x... .x..		Buffer pool location, coded in the DCB macroinstruction.
0... .1..	0	Hierarchy 0 main storage.
1... .0..	1	Hierarchy 1 main storage.
.xxx ..xx		Reserved bits.
.... x...		Buffering technique:
.... 1...	D	Dynamic buffering.

3. DCBERROP — Error recovery procedure.

	Code	
xxx.		Reserved bits.
...1	T	On-line test facilities to be used.
.... 1...	C	Threshold and cumulative error counts to be maintained.
.... .1..	W	Text-write errors to be retried.
.... ..1.	R	Text-read errors to be retried.
....0	E	Basic error procedures to be followed.
....1	N	No error recovery procedures to be followed.

Notes:

4. DCBOFLGS — Flags used by the open routine.

xxx. xx.x	Reserved bits.
...1	OPEN has been successfully completed.
.... ..0.	Set to 0 by an I/O support function when that function takes a user exit. (It is set to 0 to inhibit other I/O support functions from processing this particular DCB.)
.... ..1.	Set to 1 on return from the user exit to the I/O support function that took the exit.

5. DCBIFLG — Flags used by I/O supervisor to communicate error conditions and to determine corrective procedures.

00..	Not in error procedure.
01..	Error correction in process.
11..	Permanent error condition.
..10	Channel 9 printer carriage tape punch sensed.
..01	Channel 12 printer carriage tape punch sensed.
.... 00..	Always use I/O supervisor error routine.
.... 01..	Test IOS mask (IMSK) for error procedure.
.... 11..	Never use I/O supervisor error routine.
.... 10..	(OPEN sets
.... 01	these bits.)
.... ..xx	Reserved bits.

6. DCBMACR — Macroinstruction reference.

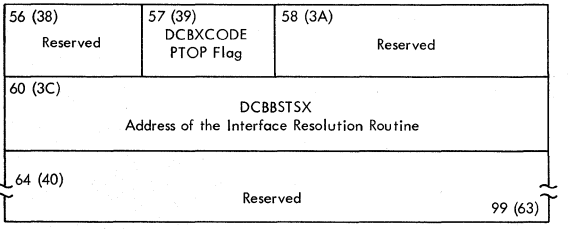
Byte 1

xx.x xxxx	Reserved bits.
..1.	READ.

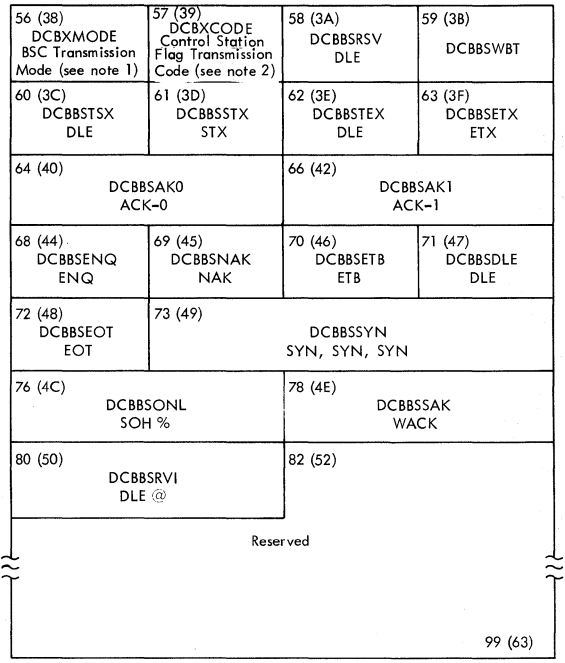
Byte 2

xx.x xxxx	Reserved bits.
..1.	WRITE.

BSC INTERFACE-BEFORE OPEN



BSC INTERFACE-AFTER OPEN



Notes:

1. DCBXMODE — Mode of transmission for binary synchronous communication (BSC).

.1..	Intermediate block checking is to be performed.
..1.	Transmission is through a 2701 Data Adapter Unit Dual Communication Interface B.
.... 1...	Transmission is in code B for a 2701 Data Adapter Unit Dual Code Feature.
x..x .xxx	Reserved bits.

2. DCBXCODE — BSC control station flag, transmission code.

x...	BSC control station flag.
0...	This is the control station.
1...	This is the remote station.
.x..	If PTOP is specified in the SYSGEN procedure:
.1..	Schedule an asynchronous exit to the interface resolution routine.
..1. 1...	6-bit Transcode is being used.
...1 .1..	USASCII transmission code is being used.
.... 00..	EBCDIC transmission code is being used.
.... ..xx	Reserved bits.

DCB - GAM
(Pointed to by DEB)

GRAPHIC DEVICE INTERFACE

0 (0) Reserved		
12 (C) DCBBRSA Buffer Restart Address	14 (E) DCBGTYPE Basic/Express (see note 1)	15 (F) Reserved
16 (10) DCBBFRST Buffer Start Address	18 (12) DCBBFRSZ Buffer Size 19 (13)	

COMMON INTERFACE

20 (14) Reserved	
	26 (1A) DCBDSORG Data Set Organization First Byte = Zeros Second Byte = X'80' is GS
28 (1C) DCBIOBAD Address of First IOB 31 (1F)	

FOUNDATION EXTENSION

32 (20) DCBGNCP No. of I/O Instructions Before WAIT	33 (21) DCBPOLST Address of DCB List for Polling
36 (24) Reserved	37 (25) DCBEXLST Address of User's Exit List 39 (27)

FOUNDATION

Before Open

40 (28) DCBDDNAM Name from DD Statement		
48 (30) DCBOFLG Open Flags (see note 2)	49 (31) DCBIFLG IOS Error Flags	50 (32) DCBMACR Type of Macroinstruction and Options (see note 3) 51 (33)

After Open

40 (28) DCBTIOT Offset to DD Entry in TIOT		42 (2A) DCBMACRF Type of I/O Macroinstruction and Options (see note 3)
44 (2C) DCBIFLGS IOS Error Flags	45 (2D) DCBDEBAD Address of DEB	
48 (30) DCBOFLGS Open Flags (see note 2)	49 (31) DCBGIOCR Address of I/O Control Routine 51 (33)	

Notes:

1. DCBGTYPE — Type of buffer management and attention handling.

   00 Express.
   01 Basic.

2. DCBOFLG — Flags used by the open routine.

   1... .... Last I/O operation was a GWRITE.
   0... .... Last I/O operation was a GREAD.
   .x.. .... Reserved bit.
   ..1. .... Set to 1 by EOV when it calls the close routine for concatenation of data sets with unlike attributes.
   ...1 .... An OPEN has been successfully completed.
   .... 1... Set to 1 by a problem program to indicate a concatenation of unlike attributes.
   .... .1.. Tape mark has been read.
   .... ..0. Set to 0 by an I/O support function when that function takes a user exit. It is set to 0 to inhibit other I/O support functions from processing this particular DCB.
   .... ..1. Set to 1 on return from the user exit to the I/O support function that took the exit.
   ....1 Set to 1 by an I/O support function if the DCB is to be processed by that function.

3. DCBMACR — Major macroinstructions and their associated options.

   Byte 1

   0010 .... Read operation to be performed.
   .... 0010 Control operation to be performed with the read operation.

   Byte 2

   0010 .... Write operation to be performed.
   .... 0010 Control operation to be performed with the write operation.

DATA EXTENT BLOCK

DEB - ORDINARY
(Pointed to by TCB)

APPENDAGE TABLE

-36 (-24) DEBEOEA Address of End-of-Extent Appendage
-32 (-20) DEBSIOA Address of Start I/O Appendage
-28 (-1C) DEBPCIA Address of PCI Appendage
-24 (-18) DEBCEA Address of Channel-End Appendage
-20 (-14) DEBXCEA Address of Abnormal-End Appendage -17 (-11)

DEB PREFIX

-16 (-10) DEBWKARA I/O Support Work Area	-15 (-F)
DEBDSCBA Address of DSCB	
-8 (-8) DEBDCBMK DCB Modification Mask	
-4 (-4) DEBLNGTH Length of DEB in doublewords	-3 (-3) Reserved -1 (-1)

Comments:

BASIC SECTION

0 (0) DEBNMSUB No. of Subroutines	1 (1) DEBTCBAD Address of TCB	
4 (4) DEBAMLNG Acc M S'n Length	5 (5) DEBDEBAD Address of Next DEB	
8 (8) DEBOFLGS Data Set Status (see note 1)	9 (9) DEBIRBAD Address of IRB	
12 (C) DEBOPATB Type of I/O (see note 2)	13 (D) DEBQSCNT PURGE - Quiesce Count	14 (E) Reserved
16 (10) DEBNMEXT No. of Extents	17 (11) DEBUSRPG Address of First IOB in User Purge Chain	
20 (14) DEBPRIOR Priority	21 (15) DEBECBAD Address of Parameter List to Find Purge ECB	
24 (18) DEBPROTG, DEBDEBID Protection Key, DEB Id (see note 3)	25 (19) DEBDCBAD Address of DCB	
28 (1C) DEBEXSCL Extent Scale	29 (1D) DEBAPPAD Address of I/O Appendage Vector Table	31 (1F)

Notes:

1. DEBOFLGS — Data set status flags.

01..	Disposition is OLD.
10..	Disposition is MOD.
11..	Disposition is NEW.
..1.	End of volume (EOV), or end of file (EOF).
...1	Disk: Release unused external storage. Tape: Emulator tape with second generation format.
.... 1...	DCB modification.
.... .1..	Disk: Split cylinder. Tape: 7-track emulator tape with possible mixed parity records.
.... ..1.	Nonstandard labels.
....1	For magnetic tape devices, use reduced error recovery procedure.

Notes:

2. DEBOPATB — The method of input/output processing and the disposition that is to be performed when an end-of-volume condition occurs.

1...	MVT: Set by ABEND. Indicates a SYSABEND or SYSUDUMP.
.0..	Always zero.
..01	REREAD.
..11	LEAVE.
.... 0000	INPUT.
.... 1111	OUTPUT.
.... 0011	INOUT.
.... 0111	OUTIN.
.... 0001	RDBACK.
.... 0100	UPDAT.

3. DEBPROTG, DEBDEBID

xxxx	Protection key.
.... 1111	A hex F to identify this block as a DEB.

ISAM SECTION

32 (20) DEBNIEE No. of Extents	33 (21) DEBFIEAD Address of First Index Extent
36 (24) DEBNPEE No. of Extents	37 (25) DEBFPEAD Address of First Prime Data Area Extent
40 (28) DEBNOEE No. of Extents	41 (29) DEBFOEAD Address of First Overflow Extent
44 (2C) DEBDISAD Address of Privileged Module	47 (2F)

DEVICE DEPENDENT SECTION

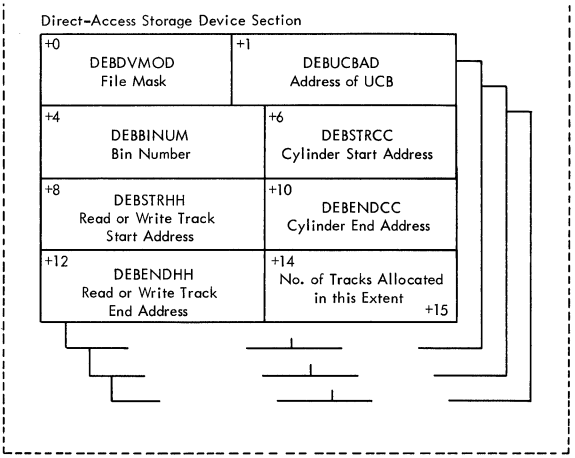
Unit Record, Magnetic Tape Devices Section

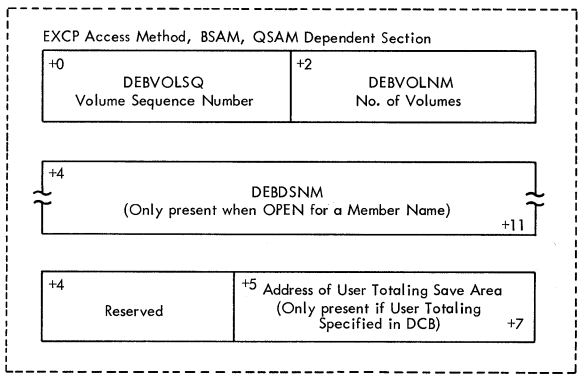
32 (20) DEBDVMOD Device Modifier (see note)	DEBUCBAD Address of UCB 35 (23)

Telecommunication Devices

32 (20) Reserved	33 (21) DEBUCBAD Address of UCB 35 (23)

DEBUCBAD

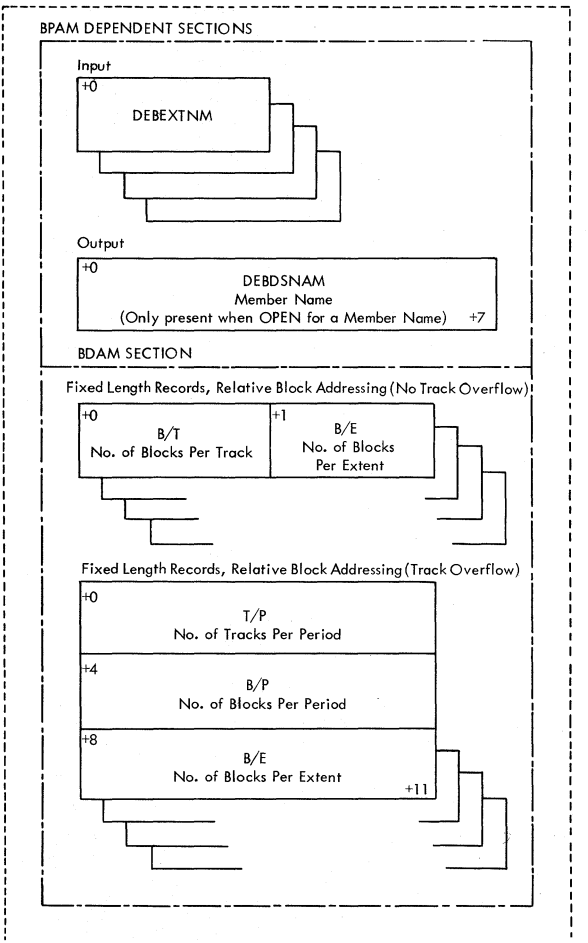


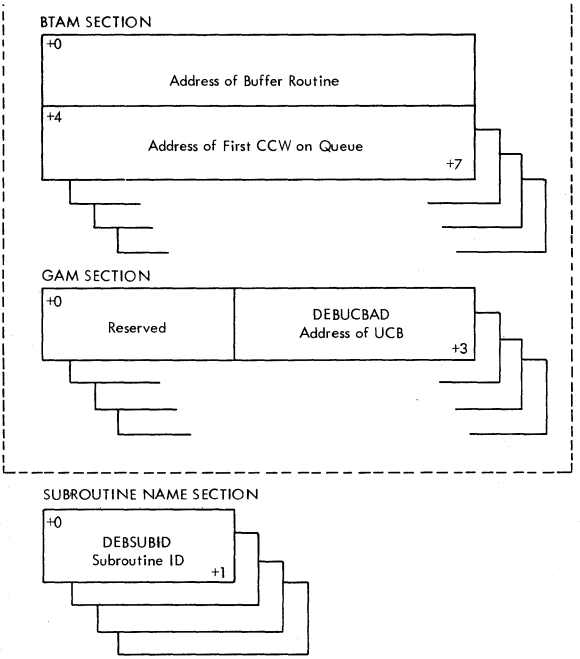


Note:

DEBDVMOD — Device modifier.

Magnetic tape -- SET MODE operation code.
Unit record -- not used.


BPAM DEPENDENT SECTIONS
Input
+0
DEBEXTNM
Output
+0
DEBDSNAM
Member Name
(Only present when OPEN for a Member Name)
+7
BDAM SECTION
Fixed Length Records, Relative Block Addressing (No Track Overflow)
+0
B/T
No. of Blocks Per Track
+1
B/E
No. of Blocks
Per Extent
Fixed Length Records, Relative Block Addressing (Track Overflow)
+0
T/P
No. of Tracks Per Period
+4
B/P
No. of Blocks Per Period
+8
B/E
No. of Blocks Per Extent
+11


BTAM SECTION
+0
Address of Buffer Routine
+4
Address of First CCW on Queue
+7
GAM SECTION
+0
Reserved
DEBUCBAD
Address of UCB
+3
SUBROUTINE NAME SECTION
+0
DEBSUBID
Subroutine ID
+1

MESSAGE PROCESS QUEUE

Prefix

-16 (-10) Work Area	-15 (-F) DSCB Address
-8 (-8) DCB Mask	
-4 (-4) Length	-3 (-3) Reserved -1 (-1)

Basic Section

0 (0) Reserved	1 (1) Address of TCB
4 (4) Reserved	5 (5) Address of Next DEB
8 (8) Reserved	
	17 (11) Address of Next Record
20 (14) Reserved	21 (15) Address of Next DEB
24 (18) ID X'0F'	25 (19) Address of DCB
28 (1C) Reserved	29 (1D) Address of DEB + 48
32 (20) First Word of Dummy LCB 35 (22)	

Queue Control Block

36 (24) Reserved	37 (25) Address of Dummy Entry
40 (28) Reserved	
	45 (2D) Address of QPRIRITY Subtask 47 (2F)

Buffer Request Block

48 (30) Reserved	
52 (34) Priority	53 (35) Reserved
56 (38) Op Code X'08'	57 (39) Address of QCB
60 (3C) Hex Code X'07'	61 (3D) Address of DEB + 32 63 (3F)

64 (40) Size of Work Area	66 (42)
Reserved	87 (57)

DESTINATION QUEUE

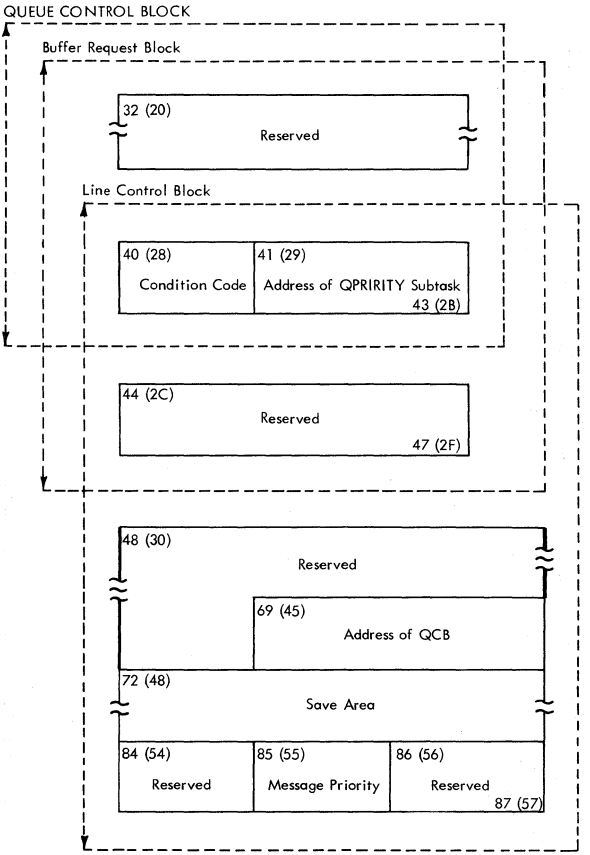
Prefix

-16 (-10) Work Area	-15 (-F) DSCB Address
-8 (-8) DCB Mask	
-4 (-4) Length	-3 (-3) Reserved -1 (-1)

Basic Section

0 (0) Reserved	1 (1) Address of TCB
4 (4) Reserved	5 (5) Address of Next DEB
8 (8) Reserved	21 (15) Address of Next DEB
24 (18) ID X'0F'	25 (19) Address of DCB
28 (1C) Reserved 31 (1F)	

Comments:


QUEUE CONTROL BLOCK
Buffer Request Block
32 (20)
Reserved
Line Control Block
40 (28)
Condition Code
41 (29)
Address of QPRIRITY Subtask
43 (2B)
44 (2C)
Reserved
47 (2F)
48 (30)
Reserved
69 (45)
Address of QCB
72 (48)
Save Area
84 (54)
Reserved
85 (55)
Message Priority
86 (56)
Reserved
87 (57)

DATA EVENT CONTROL BLOCK

DECB - BSAM

0 (0) DECSDECB Event Control Block	
4 (4) DECTYPE or DCBPTR Type of I/O Request Ptr to Next DECB (see note 1)	6 (6) DECLNGTH Length of Key and Data
8 (8) DECDCBAD Address of DCB	
12 (C) DECAREA Address of Key and Data or of User-specified Channel Program	
16 (10) DECIOBPT Address of IOB 19 (13)	
20 (14) DECNXADR Address of Next Address Feedback Field	

DECB - GAM

0 (0) DECBECB ECB	
4 (4) DECBTYPE Type of Input/Output Operation (see note 1)	
8 (8) DECBDCB DCB Address	
12 (C) DECBADDR Area Address/DCBZ Address	
16 (10) DECBHEX Error Code	17(11) DECBCNT CSW Residual Count on Certain Errors
20 (14)	21 (15) DECBOCBP OCBP Pointer
24 (18)	25 (19) DECBSTRT Start Address of Control Orders
28 (1C) DECBUNIT Unit Index	29 (1D) DECBBUFF Buffer Address

DECB - BISAM

0 (0) DECBECB Event Control Block		
4 (4) DECBTYP1 Options (see note 2)	5 (5) DECBTYP2 Type of I/O (see note 3)	6 (6) DECBLGTH No. of Bytes Read or Written
8 (8) DECBDCBA Address of DCB		
12 (C) DECBAREA Storage Address for Record		
16 (10) DECBLOGR Address of Logical Record		
20 (14) DECBKEY Address of Key Portion of Record		
24 (18) DECBEXC1 Exceptional Condition Codes (see note 4)	25 (19) DECBEX2 Exceptional Condition Codes (see note 5)	

Notes:

1. DECTYPE — Type of I/O request.

   Byte 1 — Type of length operand:

   1... .... — S-coded for length.
   .xxx xxxx — Reserved bits.

   Byte 2 — Type of operation.

   1... .... — READ SF.
   .1.. .... — READ SB.
   ..1. .... — WRITE SF.
   ...1 .... — WRITE SD.
   .... x.x. — Reserved bits.
   .... .1.. — WRITE SZ.
   ..1. ...1 — WRITE SFR.

2. DECBTYP1 — Options.

   xxxx xx.. — Reserved bits.
   .... ..1. — Length coded as 'S'.
   ....1 — Area coded as 'S'.

3. DECBTYP2 — Type of I/O request.

   1... .... — READ K.
   .x.x ..xx — Reserved bits.
   ..1. .... — READ KU.
   .... 1... — WRITE K.
   .... .1.. — WRITE KN.

Notes:

4. DECBEXC1 — Exceptional condition code.

1...	Record not found.
.1..	Record-length check.
..1.	Space not found in which to add a record.
...1	Invalid request.
.... 1...	Uncorrectable I/O error.
.... .1..	Unreachable block.
.... ..1.	Overflow record.
....1	Duplicate record presented for inclusion in the data set.

5. DECBEXC2 — Exceptional condition code.

.... ..1.	Execution of the last channel program was instituted by an asynchronous routine.
....1	Previous macroinstruction was READ KU.
xxxx xx..	Reserved bits.

Comments:

0 (0) DECSDECB Event Control Block (see note 1)	
4 (4) DECTYPE Type of I/O Request (see note 2)	6 (6) DECLNGTH Length of Data
8 (8) DECDCBAD Address of DCB	
12 (C) DECAREA Address of the Data	
16 (10) DECIOBPT Address of the IOB	
20 (14) DECKYADR Address of the Key	
24 (18) DECRECPT Address of Block Reference Field	
28 (1C) DECNXADR Address of the Next Address Feedback Field 31 (1F)	

Notes:

1. DECSDECB — Event control block.

   Byte 1 — Waiting for event completion.

   `1... ....` Waiting for completion of event.
   `.xxx xxxx` Reserved bits.

   Byte 2-4 — Address of the request block for the program waiting for completion of the event.

   Byte 1 — After event completion.

   `x.xx xxxx` Reserved bits.
   `.1.. ....` Event has completed.

   Byte 2

   `1... ....` Record not found.
   `.1.. ....` Record-length check.
   `..1. ....` Space not found.
   `...1 ....` Invalid request.
   `.... 1...` Uncorrectable I/O error.
   `.... .1..` End of data.
   `.... ..1.` Uncorrectable error other than an I/O error.
   `.... ...1` A READ with exclusive control was not preceded by a WRITE with exclusive control.

Byte 3

x...	Reserved bit.
.1..	A WRITE macroinstruction was addressed to an input data set.
..1.	An extended search was specified with the DCBLIMCT field set to zero.
...1	The block requested is not within the data set.
.... 1...	A write-by-identification (DI) addressed record zero.
.... .1..	A search-on-key (DK) was specified with the DCBKEYLE field set to zero or without an address for the key.
.... ..1.	A macroinstruction used an option not set in the DCB.
....1	The key for the fixed-length record to be added begins with hex FF.

Byte 4 — Reserved.

2. DECTYPE — Type of I/O request.

Byte 1

1...	Verify.
.1..	Overflow.
..1.	Extended search.
...1	Feedback.
.... 1...	Actual addressing.
.... .1..	Dynamic buffering.
.... ..1.	Read exclusive.
....1	Relative block addressing.

Byte 2

1...	S-coded for key address.
.1..	S-coded for block length.
....x	Reserved bit.
.... x...	Type of operation:
.... 0...	WRITE.
.... 1...	READ.
.... .x..	Type of search argument:
.... .0..	ID.
.... .1..	Key.
.... ..1.	Add option of write operation.
..11	RU is suffixed to the type, indicating that next address can be either a record or a capacity record, whichever occurred first.
...1	R is suffixed to the type, indicating that the next address is specified.

0 (0) LINEDECB Always Zero		
4 (4) Reserved	5 (5) Op Code	6 (6) Length of Input Area
8 (8) Address of DCB		
12 (C) Address of Data in Buffer		
16 (10) Reserved		
20 (14) No. Messages Received	21 (15) Address of Active Entry in Polling List	
24 (18) Reserved	25 (19) Index, in DEB, to UCB	26 (1A) Reserved
28 (1C) Reserved		
32 (20) Address of Addressing Characters in Terminal Entry		
36 (24) Reserved	37 (25) Address of Polling List 39 (27)	

0 (0) DECSDECB Event Control Block		
4 (4) DECTYPE Programming, Indicators, Code (see note 1)		6 (6) DECBLNGTH Buffer Length, Message Area Length
8 (8) DECBUFCT Buffer Count (see note 2)	9 (9) DECDCBAD DCB Address	
12 (C) DECAREA Buffer Address, Message Area Address		
16 (10) DECSENS0 Sense Byte	17 (11) DECSENS1 Reserved	18 (12) DECCOUNT CSW Residual Count
20 (14) DECCMCOD, DECENTRY Error Command, Terminal List Address		
24 (18) DECFLAGS Operations Status (see note 3)	25 (19) DECRLN Relative Line No.	26 (1A) DECRESPN Addressing Response, VRC/LRC Response
28 (1C) DECTPCOD Operation (see note 4)	29 (1D) DECERRST I/O Error Status (see note 5)	30 (1E) DECCSWST CSW Status
32 (20) DECADRPT Address of Previous Entry in Addressing List		
36 (24) DECPOLPT Contents Depend on Use of Autopoll, Programmed Polling, or BSC (see note 6)		

BSC Extension

40 (28) Reserved	42 (2A) DECWLNG Data Area Length
44 (2C) DECWAREA Data Area Address 47 (2F)	

Notes:

1. DECTYPE — Programming indicators.

Byte 1

1...	READ, using Autopoll.
.xxx x...	Reserved bits.
.... .1..	S-coded for terminal entry.
.... ..1.	S-coded for area.
....1	S-coded for length.

Byte 2

Command Code		
00	TB	Write break.
01	TI	Read initial.
02	TI	Write initial.
03	TT	Read continue.
04	TT	Write continue.
05	TV	Read conversational.
06	TV	Write conversational.
07	TP	Read repeat (other than WTTA).
07	TE	WTTA: Read continue with identification exchange.
08	TA	Write positive acknowledgment.
09	TS	Read skip.
0A	TN	Write negative acknowledgment.
	TR	Write reset (BSC).
0B	TB	Read buffer.
0C	TL	Write at line address.
	TIO	Write initial optical.
0D	TIV	Write initial conversational.
	TTA	Read continue with leading acknowledgment.
0E	TS	Write erase.
	TCO	Write invitational optical.
0F	TTV	Write continue conversational.
10	TD	Write disconnect.
11	TTS	Read stop.
12	TIX	Write initial transparent.
	TVO	Write conversational optical.
13	TTL	Read continue with leading graphics.
14	TTX	Write continue transparent.
15	TQ	Read inquiry.
16	TQ	Write inquiry.
17	TPL	Read repeat with leading graphics.
19	TIQ	Read initial inquiry.
1A	TW	Write wait before transmitting.
1B	TRV	Read interrupt.
1C	TC	Write connect.
1D	TIVX	Write initial conversational transparent.
1F	TTVX	Write continue conversational transparent.
82	TIR	Write initial with reset.
83	TTR	Read continue with reset.
84	TTR	Write continue with reset.
85	TVR	Read conversational with reset.
86	TVR	Write conversational with reset.
87	TPR	Read repeat with reset.
8C	TLR	Write at line address with reset.
8E	TSR	Write erase and reset.
92	TIXR	Write initial transparent with reset.
94	TTXR	Write continue transparent with reset.

Notes:

2.	DECBUFCT	Contains a running count of buffers obtained by BTAM for the current read operation (dynamic buffering only). Use differs during BSC and 2760 on-line test.
	0...	On-line test requested by RFT message (BSC).
	1...	On-line test initiated by ONLTST macroinstruction (BSC).
	.0..	Sending test messages (BSC).
	.1..	Receiving test messages (BSC).
		Type 11 on-line test for 2760 Optical Image Unit.
	..xx xxxx	Reserved bits.
3.	DECFLAGS	Operation status.
	xxx.	One of the following: Start-stop operations. Reserved bits. BSC operations:
	1...	WACK received.
	.1..	Acknowledgment other than ACK-0 or ACK-1 received.
	..1.	Acknowledgment alteration incorrect.
	...1	One of the following: TWX 33/35 terminal, BSC terminal: Incorrect ID received. Autopoll: Index byte received does not match an active byte. BSC network: Contention occurred. WTTA: Contention occurred.
	.... 1...	READ, dynamic buffering: No buffer available (message lost).
	.... .1..	One of the following: OPENLST, POLLING: Negative response to polling received. WRAPLST: All entries are inactive. Addressing: Negative response to addressing received. WTTA: Last message received ended with EOT or time-out.
	.... ..1.	WTTA: Message ended with WRU signal. BSC stations: Reverse interrupt (RVI) sequence was received (see also bit 1).
	1	WTTA: Contention condition was encountered.

Notes:

4.

DECTPCOD		Terminal type
00		On-line test.
01		Disable when DISABLE is the first command of a channel program. Dial. Enable. Prepare. Write pad character. Write wait before transmitting. Write tone for data sets that do not generate a data tone.
02	WTTA	Sense. Write control characters Ⓓ Ⓒ Ⓒ Ⓒ before selection. Write EOT sequence before polling or addressing. Write response to text.
	2740, Basic	Write Ⓓ and 15 idle characters.
	2760	Write Ⓓ Prefix o.
03		Write polling, addressing, or broadcast characters. Poll write inquiry.
	TWX	Write turnaround sequence.
	TWX, BSC	Write CPU-ID sequence.
04	2740 w/st.c	Write space, sense. (w/st.c. - with station control).
	2260R	Write 2848 command.
	83B3	Write FIGS shift.
	1030	Write 1.
	WTTA	Write WRU. Write identification. Write padding characters. Write letter shift characters.
05		Read response to polling.
06		Read response to addressing.
07	TWX, BSC	Read ID response.
08	1030 1050 2740 1060 2260	Write end-of-addressing character after addressing.
	BSC	Write response to inquiry. Write response to text. Write EOT, SYN, SYN, SYN, before polling or addressing.
	2760	Write (B).
09		NOP or TIC after poll in a READ with SSALST, SSAWLST, AUTOLST, or AUTOWLST.
0A		Read index (autopoll). Read response to polling (programmed polling).
0B	BSC	Read inquiry.

Notes:

4. DECTPCOD - continued

0C	BSC	Read response to inquiry.
10	2260R	Write at line address.
11		Read or write text.
	2760	Write frame-change characters.
12		Read skip or TIC for dynamic buffering.
13	BSC	Write end-of-transparent-text characters.
20		Start-stop read response to text.
21		All reset commands.
22		Read skip.
23		Write break.
24		V open, LOPEN or close routine operation.
25	BSC	Read response to text.
40-4C 50-53 61-65		The last CCW executed was the first Read or Write Text CCW to be executed in a channel program using dynamic buffering.
80-8C 90-93 A1-A5		The last CCW in a channel program was executed.

5. DECERRST — I/O error status flags.

1...	SIO resulted in a condition code of 3.
.1..	Undefined error condition.
..1.	An error condition occurred during an I/O operation initiated by the error recovery routines.
...1	Diagnostic write/read operation ended because of error (2701 only).
.... 1...	Disable command issued to a switched-connected line by error recovery routine because of permanent error on that line.
.... .xxx	Reserved bits.

6. DECPOLPT — One of the following:

Programmed polling:
Address of the current entry in the polling list.

Autopoll:
Byte 1: Indexed to current entry in polling list.
Bytes 2-4: Address of polling list.

BSC on-line test:
Address of text data.

BSC extension:
Fields are present only if BSC is specified in the OPEN macroinstruction.

+0 (0)	+1 (1)
(see note 1)	(see note 2)
W C	

Notes:

1.

Awaiting completion of an event:

1... .... W - Waiting for completion of an event.

After completion of an event:

.1.. .... C - The event has completed.

..xx xxxx Completion code.

One of the following completion codes appears at the completion of a channel program:

Access Methods Other Than BTAM

7F	Channel program has terminated without error. (CSW contents useful.)
41	Channel program has terminated with permanent error. (CSW contents useful.)
42	Channel program has terminated because a direct-access extent address has been violated. (CSW contents do not apply.)
44	Channel program has been intercepted because of permanent error associated with device end for previous request. The intercepted request may be reissued. (CSW contents do not apply.)
48	Request element for channel program has been made available after the channel program has been purged. (CSW contents do not apply.)
4F	Error recovery routines have been entered because of direct-access error but are unable to read home address or record 0. (CSW contents do not apply.)

BTAM

7F	Completed normally.
41	Completed with an I/O error.
48	Enable command halted, or, I/O operation purged.

2.

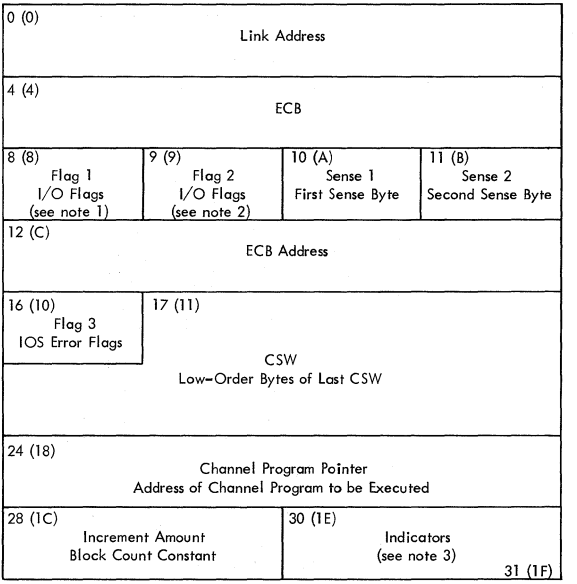
Awaiting completion of an event:

Request block address.

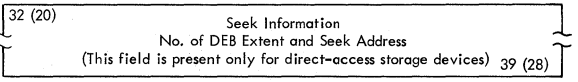
After completion of the event:

Zeroes, or remainder of completion code.

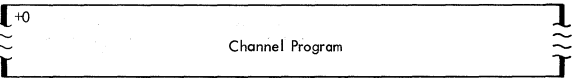
INTERRUPTION CONTROL BLOCK (ICB)



DIRECT-ACCESS STORAGE DEVICES



CHANNEL PROGRAM



Notes:

1. Flag byte 1.

00..	No chaining.
01..	Command chaining.
10..	Data chaining.
11..	Both command and data chaining.
..1.	Error routine in control.
...1	Device is to be repositioned.
.... 1...	Cyclic redundancy check (CRC) needed (tape only).
.... .1..	Exceptional condition. If this bit is on after control has been returned from the error routine, the error is considered permanent.
.... ..1.	IOB unrelated flag (i.e., nonsequential).
....0	START.
....1	RESTART.

2. Flag byte 2.

1...	Halt I/O has been issued.
.1..	Sense is not performed until the device is free.
..1.	IOB has been purged.
...1	Home address (R0) record is to be read.
.... xxx.	Internal I/O supervisor error correction flags.
....1	QSAM error recovery routine in control for a 2540 Punch with three buffers.

3.

1...	Special volume-full indicator signifying end-of-tape mark or reflective spot sensed along with a read or write error.
.xxx xxxx	Reserved bits (always zero).

BDAM - BFTEK = R and RELFM = VS

-8 (-8) DEQIND (see note 2)	-7 (-7) DEQIOB Address of IOB to Dequeue Tracks of Spanned Record
-4 (-4) SWAPTR Address of the Segment Work Area	

GAM, QISAM

-4 (-4) Event Control Block -1 (-1)

QSAM, BSAM, BPAM - Normal Scheduling

-8 (-8) I/O Flags (see note 1)	-7 (-7) Address of Next IOB
-4 (-4) Event Control Block -1 (-1)	

QSAM, BSAM - Chained Scheduling

-16 (-10) FLAG1 I/O Indicators (see note 3)	-15 (-F) Reserved	-14 (-E) INNOP Offset to Last I/O for Input	-13 (-D) OUTNOP Offset to Last I/O for Output
-12 (-C) Event Control Block			
-8 (-8) FIRSTICB Address of First ICB			
-4 (-4) Last NOP Address -1 (-1)			

0 (0) IOBFLAG1 I/O Flags (see note 4)	1 (1) IOBFLAG2 I/O Flags (see note 5)	2 (2) IOBSENS0 First Sense Byte	3 (3) IOBSENS1 Second Sense Byte
4 (4) IOBECBCC Completion Code	5 (5) IOBECBPT Address of ECB		
8 (8) IOBFLAG3 I/O Error Flags (see note 15)	9 (9) IOBCSW Seven Low-Order Bytes of Last CSW		
16 (10) IOBSIOCC SIO Condition Code	17 (11) IOBSTART Address of Channel Program		
20 (14) Reserved	21 (15) IOBDCBPT Address of DCB		
24 (18) IOBRESTR PURGE Chain/CCHH/Command, Channel Program			
28 (1C) IOBINCAM (use varies) (see note 6)		30 (1C) IOBERRCT No. of Error Retries	31 (1F)

EXTENSION

BTAM

32 (20) IOBUCBX UCB Index	33 (21) IOBWORK Error Routine and ONLTT Routine Work Area		
		38 (26) Sent (BSC)	39 (27) Received (BSC)
40 (28) IOBERCCW Error Routine CCW			
48 (30) IOBERINF Error Routine Data Contains CSW and CCW in Error or Zeros			
64 (40) IOBCPA Channel Programs			

GAM

32 (20) IOBUCBX UCB Index	33 (21) Reserved
36 (24) Status Indicators (see note 7)	37 (25) IOBNXTPT Address of Next Available IOB
40 (28) IOBCCW List of CCW's 71 (47)	

Direct-Access Storage Devices

32 (20) IOBSEEK No. of DEB Extent and Seek Address (This field may be present only for direct-access storage devices) 39 (27)

BSAM, QSAM, BPAM

+0 Channel Program
Additional Search Addresses (This field may be present only for direct-access storage devices)

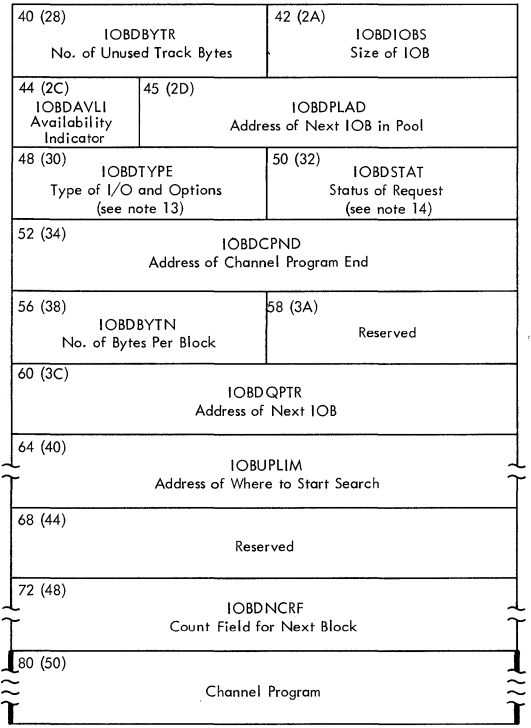
QISAM

40 (28) W1IEXTEN, W1OEXTEN Appendage Codes (see note 8) 41 (29)

BISAM

40 (28) IOBCCWAD Fixed-Length Record: Address of First CCW Variable-Length Records: Buffer Address			
44 (2C) IOBINDCT Queue Indicators (see note 9)	45 (2D) IOBUNSQR Reason Queue Unscheduled (see note 10)	46 (2E) IOBAPP Appendage Codes (see note 11)	47 (2F) IOBASYN Asynchronous Code (see note 12)
48 (30) IOBCOUNT Write Check Count	49 (31) IOBCHAD Forward Chain Address		
52 (34) IOBBCHAD Backward Chain Address 55 (37)			

BDAM


40 (28)
IOBDBYTR
No. of Unused Track Bytes
42 (2A)
IOBDIOBS
Size of IOB
44 (2C)
IOBDAVLI
Availability Indicator
45 (2D)
IOBDPLAD
Address of Next IOB in Pool
48 (30)
IOBDTYPE
Type of I/O and Options (see note 13)
50 (32)
IOBDSTAT
Status of Request (see note 14)
52 (34)
IOBDCPND
Address of Channel Program End
56 (38)
IOBDBYTN
No. of Bytes Per Block
58 (3A)
Reserved
60 (3C)
IOBDQPTR
Address of Next IOB
64 (40)
IOBUPLIM
Address of Where to Start Search
68 (44)
Reserved
72 (48)
IOBDNCRF
Count Field for Next Block
80 (50)
Channel Program

Notes:

1. Flag byte.

1...	PRTOV has occurred.
.1..	A write operation is in process.
..1.	A read operation is in process.
...1	Update flag. Set on, together with bit 1 of this byte, to show that the block is to be updated. Can only occur if the OPEN parameter is UPDAT.
.... 1...	IOB being used for backspace, control, or note/point operation.
.... .xx.	Reserved bits.
....1	This is the first IOB.

2. DEQIND

1...	Track containing spanned records being dequeued.
.xxx xxxx	Reserved bits.

3. FLAG1 — I/O indicators.

xxxx x...	Reserved bits.
.... .1..	Error has been processed once by abnormal-end appendage routine.
.... ..1.	Restart channel.
....1	Set when a program controlled interruption (PCI) occurs.

4. IOBFLAG1 — Flag byte 1.

00..	No chaining.
01..	Command chaining.
10..	Data chaining.
11..	Both command and data chaining.
..1.	Error routine in control.
...1	Device is to be repositioned.
.... 1...	Cyclic redundancy check (CRC) needed (tape only).
.... .1..	Exceptional condition. After the error routine returns and this bit is on, the error is considered permanent.
.... ..1.	IOB unrelated flag (i.e., nonsequential).
....0	START.
....1	RESTART.

5. IOBFLAG2 — Flag byte 2.

1...	Halt I/O has been issued.
.1..	Sense is not performed until the device is free.
..1.	IOB has been purged.
...1	Home address (R0) record is to be read.
.... xxx.	Internal I/O supervisor error correction flags.
....1	QSAM -- error recovery in control for a 2540 Punch with three buffers. BTAM -- RESETPL macroinstruction was used.

Notes:

6. IOBINCAM

QSAM, BSAM, EXCP access method --
Normal scheduling: Value used to increment block count field in DCB for magnetic tape.
Chained Scheduling: zeros.

BTAM

1...	SAD or ENABLE issued by OPEN resulted in a permanent I/O error.
.1..	This IOB is currently in use by an I/O operation.
..xx xxx.	Reserved bits.
....1	Line is under on-line test operation.

7. Status indicators.

0...	IOB available.
1...	IOB not available.
.xxx xxxx	Reserved bits.

8. W1IEXTEN, W10EXTEN

Appendage codes for both normal and abnormal channel end conditions.

Code	
0	Operation completed was a READ.
4	Operation completed was a SETL (K or I).
8	Operation completed was a WRITE.
12	Operation completed was a CHECK.
16	Operation completed was a REWRITE.
20	Operation completed was a RECHECK.

9. IOBINDCT

Indicators.

1...	Remove channel program from queue.
.1..	Unscheduled queue.
..0.	DECBAREA + 6 points to overflow record data.
..1.	DCBMSWA points to overflow record key followed by data.
...0	DECBKEY points to overflow record key.
...1	DCBMSWA + 8 points to overflow record key.
.... xxx.	Reserved bits.
....0	Normal channel end has occurred.
....1	Abnormal channel end has occurred.

10. IOBUNSQR

Reason for unscheduled queue.

1...	Channel program CP1 or CP2 busy.
.1..	No CP4, CP5, or CP6 available.
..1.	No CP7 available.
...1	WRITE KN is in effect (unscheduled IOB is for WRITE KN).
.... 1...	WRITE KN is in effect (unscheduled IOB is for READ or WRITE KN).
.... .xxx	Reserved bits.

Notes:

11. IOBAPP

Code	
4	Completion of CP14 part 2 (fixed-length records with user work area).
7	Completion of CP1 or CP2 for WRITE KN.
8	Completion of CP8.
9	Completion of CP10A for true insert or CP14 part 2 (variable-length records) for EOF Extension.
10	Completion of CP10B for true insert or CP14 part 2 (variable-length records) when part 1 has been executed.
11	Completion of CP10B for addition to end of data set.
12	Completion of CP14 or CP14 part 1 (fixed-length records with user work area and variable-length records) for setups 1, 2, and 5 (asynchronous routine codes 9, 10, and 13).
13	Completion of CP14 or CP14 part 1 (fixed-length records with user work area and variable-length records) for setups 3, 4, and 6 (asynchronous routine codes 11, 12, and 14)
14	Completion of CP15.
15	Completion of CP16 for setup 2 (search overflow chain for last overflow record in the chain: addition to end of data set).
16	Completion of CP16 for setup 3 (search overflow chain for record which logically precedes or is equal to new record to be added: true insertion).
17	Completion of CP17 when used for track index only or CP14 part 2 (variable-length records) when part 1 has not been executed (no overflow).
18	Completion of CP17 when used for track index and when it is to be continued for higher level indexes.
19	Completion of CP17 when it is to be started or continued for higher level indexes.
20	Completion of CP9A, or CP11A, or CP12A, or CP13A, or CP12AV.
21	Completion of CP9B, or CP11B, or CP12B, or CP13B, or CP12BV.
22	Completion of CP9C or CP123W or CP123WV.
23	Completion of CP10A for addition to end of data set.
24	Completion of CP12C or CP13C.

12. IOBASYN — Asynchronous routine code.

READ or WRITE K:

Code	
0	Successful completion of CP4-5-6.
1	Do an EXCP.
2	Successful completion of CP7.
3	Successful completion of CP1 or CP2.
4	Unsuccessful completion of CP4-5-6.
6	Unsuccessful completion of CP7.
7	Unsuccessful completion of CP1 or CP2.

Notes:

12. IOBASYN - continued

WRITE KN:

Code

1 Scheduled to do an EXCP that could not be done in an appendage routine because a different device (UCB) was involved.

8 Scheduled upon the successful or unsuccessful completion of a WRITE KN macro.

9 Scheduled to set up and execute CP14 when a record is bumped from a prime data track as a result of a new record being placed on that track (setup 1).

10 Scheduled to set up and execute CP14 when a new record is to be added to the end of the data set; the last track is full, and no overflow chain currently exists for the last track (setup 2).

11 Scheduled to set up and execute CP14 when a new record is to be added to the end of the data set; the last track is full, but an overflow chain does already exist for the last track (setup 3).

12 Scheduled to set up and execute CP14 when a new record is a true insert and is to go in the middle of an overflow chain (setup 4).

13 Scheduled to set up and execute CP14 when a new record is a true insert and is to become the first record in an already existing overflow chain (setup 5).

14 Scheduled to set up and execute CP14 when a new record is a true insert and has a key equal to that of the key of a record marked for deletion in the overflow chain. The new record simply replaces the deleted record (setup 6).

15 Variable-length records only: Scheduled to set up and execute CP14 when more than one record is bumped from a prime data track (setup 1).

16 Variable-length records only: Scheduled to set up and execute CP14 Extension to write an EOF mark in independent overflow.

13. IOBDTYPE — Type of request and specified options.

Byte 1

1...	Verify.
.1..	Overflow.
..1.	Extended search.
...1	Feedback.
.... 1...	Actual addressing.
.... .1..	Dynamic buffering.
.... ..1.	Read exclusive.
....1	Relative block addressing.

Notes:

13. IOBDTYPE - continued

Byte 2

1...	Key address coded as 'S'.
.1..	Block length coded as 'S'.
..11	RU is suffixed to the type, indicating that next address can be either a record or a capacity record, whichever occurred first.
...1	R is suffixed to the type, indicating that the next address is specified.
.... 1...	Read request.
.... 0...	Write request.
.... .1..	Key type.
.... .0..	ID type.
.... ..1.	Add type.
....1	RELEX macro issued.

14. IOBDSTAT — Status of the request.

Byte 1

1...	Abnormal completion.
.1..	On extended search, the next extent is on a new volume. The ASI routine must issue the EXCP macro; the end-of-extent appendage cannot.
...1	On extended search, indicates to the relative block conversion routine that the second pass of a two-pass conversion routine has completed.
.... 1...	For exclusive control request, indicates that a record has been enqueued.
.... .1..	A buffer has been assigned to this input/output block.
.... ..1.	IOB being used to add a variable (V) or undefined (U) type record to the data set.
....1	Indicates to the dynamic buffering routine that it was entered from, and is to return control to, the start I/O appendage module.
..x.	Reserved bit.

Byte 2

1...	Block not found on indicated track.
.1..	Length of block was incorrect.
..1.	No space found to write a new block.
...x	Reserved bit.
.... 1...	READ OP resulted in a data check not corrected by IOS error retry.
.... .1..	Request completed, but block is an end-of-data set record.
.... ..1.	Indicates error that cannot be attributed to any other cause as indicated by this byte.
....1	No match found on the read-exclusive list.

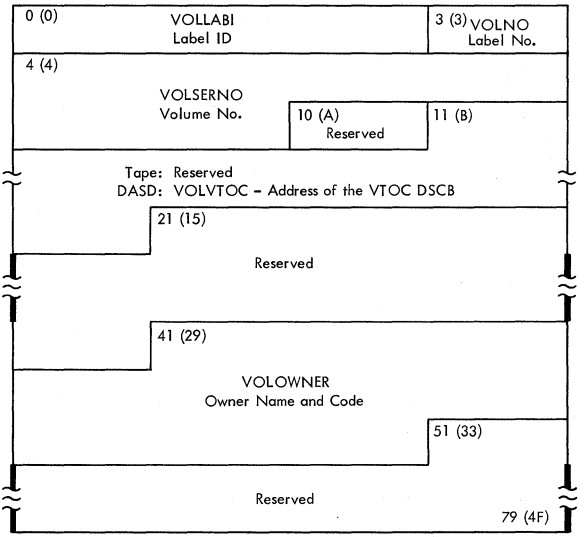
Notes:
15. IOBFLAG3

	1	2	3	4	5	6	7
1052, 2150		Wrt Err Cnt	Bus Out Cnt	Cntrl Bit M1	Msg Type	Cntrl Bit M0	Log Out Flag
2540/ 2821	Ind 1	Entry Flag	Read Err Cnt	Bus Out Cnt	Punch Retry	Msg Type	QSAM Cnt	Log Out Flag
1403/ 1443		IOB Entry Flag	Load Gen in UCS Parity	Bus Out Cnt		Msg Type		Log Out Flag
1442, 2501 2520		IOB Entry Flag	Read Err Cnt	Bus Out Cnt	Data Chk Flag	Msg Type	Over- run Cnt	Log Out Flag
2671, 2822		Eq Chk Count		Bus Out Cnt		Msg Type		Log Out Flag
2400	Noise Msg Given	IOB Entry Flag	Tape Clean Bit	Cont Flag		Msg Type	Cont Unit Busy	Log Out
2321 (2841)	IND 1	Trk Cond Flag	No Rec Fnd	Pick Flag	Re- Store Flag	Msg Type	Sweep Flag	Log Out Flag
All Other DA DVCS	IND 1	Trk Cond Flag	No Rec Fnd	Bus- Out Err Cnt	Re- Store Flag	Msg Type		Log Out Flag
2250						Msg Type		Log Out Flag
2260 (1053)						Msg Type		Log Out Flag
2280, 2282						Msg Type		Log Out Flag

VOLUME LABEL

The 80-character volume label identifies the volume and volume owner. This label is the first record on magnetic tape volumes. On 9-track tape, it is written in EBCDIC; on 7-track tape, in BCD.

On direct-access volumes, the volume label is the third record following the two IPL records. The label is recorded in EBCDIC.



Offset	Byte Length	Field Name	Field Description, Contents, Meaning
0(0)	3	VOLLABI	Label identifier must be VOL.
3(3)	1	VOLNO	Volume label sequence number.
4(4)	6	VOLSERNO	Volume serial number.
10(A)	1		Reserved (must be recorded as EBCDIC zero).
11(B)	5		Magnetic tape: reserved (must be recorded as blanks).
11(B)	5	VOLVTOC	Direct-access storage: CCHHR address of the VTOC DSCB on this volume.
16(10)	5		Reserved (must be recorded as blanks).
21(15)	20		Reserved (must be recorded as blanks).
41(29)	10	VOLOWNER	Owner name and address code for the volume owner.
51(33)	29		Reserved (must be recorded as blanks).

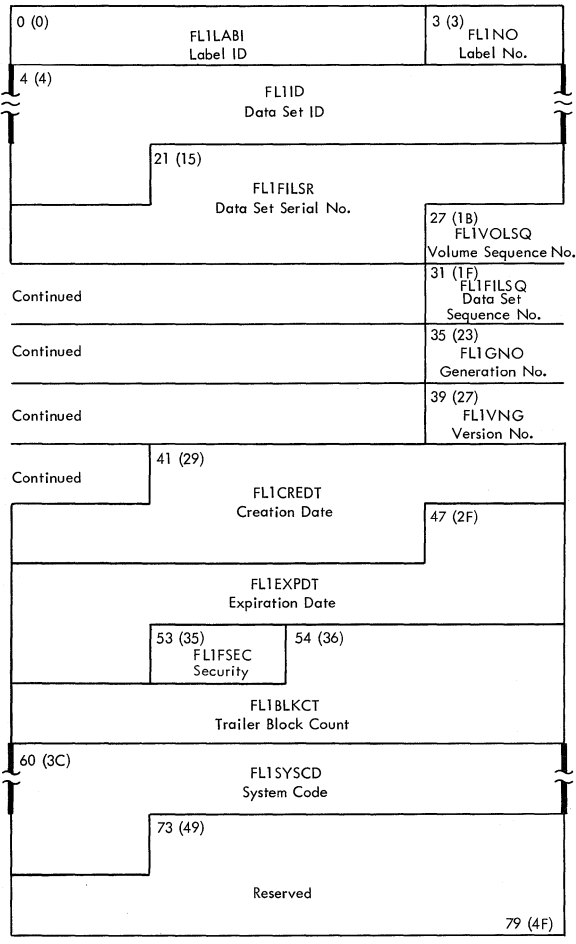
DATA SET LABELS -- MAGNETIC TAPE

The blocks of information that serve as labels for data sets residing on magnetic tape are the data set label 1 and the data set label 2. Each block is 80 bytes long and is written in EBCDIC characters in main storage and on 9-track tape, and in BCD characters on 7-track tape.

A set of a data set label 1 and a data set label 2, together with user labels (if used), makes up header labels, end-of-volume trailer labels, and end-of-data set trailer labels.

See "Data Set Label 1 (FL1)" and "Data Set Label 2 (FL2)".

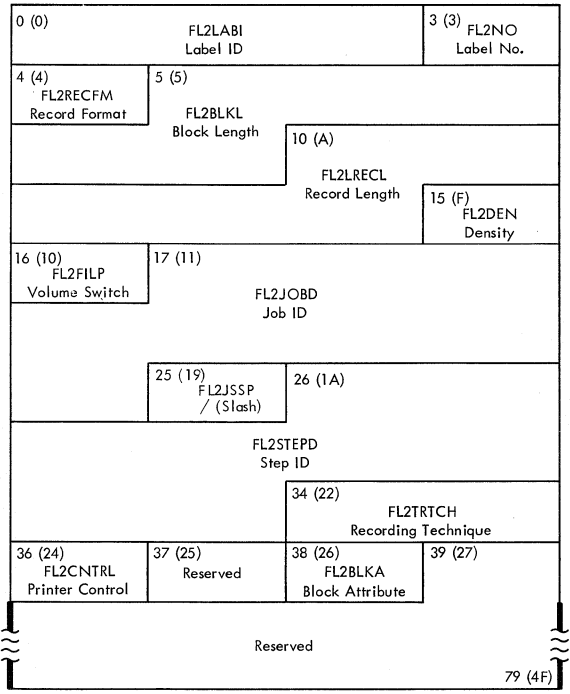
DATA SET LABEL 1 -- FL1



DATA SET LABEL 1 -- FL1 (Continued)

Offset	Byte Length	Field Name	Field Description, Contents, Meaning
0(0)	3	FL1LABI	Label identifier: HDR - header label. EOV - end-of-volume trailer label. EOF - end-of-data set trailer label.
3(3)	1	FL1NO	Data set label number is 1.
4(4)	17	FL1ID	Data set identifier.
21(15)	6	FL1FILSR	Data set serial number. Same as the code that appears in the VOLSERNO field of the initial volume label of the first or only volume of the data set or multidata set aggregate.
27(1B)	4	FL1VOLSQ	Volume sequence number. Indicates the relationship between the volume on which this data set is recorded and the volume on which the data set begins.
31(1F)	4	FL1FILSQ	Data set sequence number. Indicates the position of the data set relative to the first data set in a multidata set aggregate.
35(23)	4	FL1GNO	Generation number of the data set.
39(27)	2	FL1VNG	Version number of a generation of the data set.
41(29)	6	FL1CREDT	Creation date -- year and day: b = blank yy = year (00-99) ddd = day (001-366)
47(2F)	6	FL1EXPDT	Expiration date. Expressed in the same format as creation date.
53(35)	1	FL1FSEC	Data set security indicator: F0 - Data set is not security-protected. F1 - Data set is security-protected.
54(36)	6	FL1BLKCT	Unused in header labels (must be zero). In trailer labels, the number of blocks in this data set volume.
6(3C)	13	FL1SYSCD	System code identifying the programming system.
73(49)	7		Reserved (must be recorded as blanks).

DATA SET LABEL 2 -- FL2



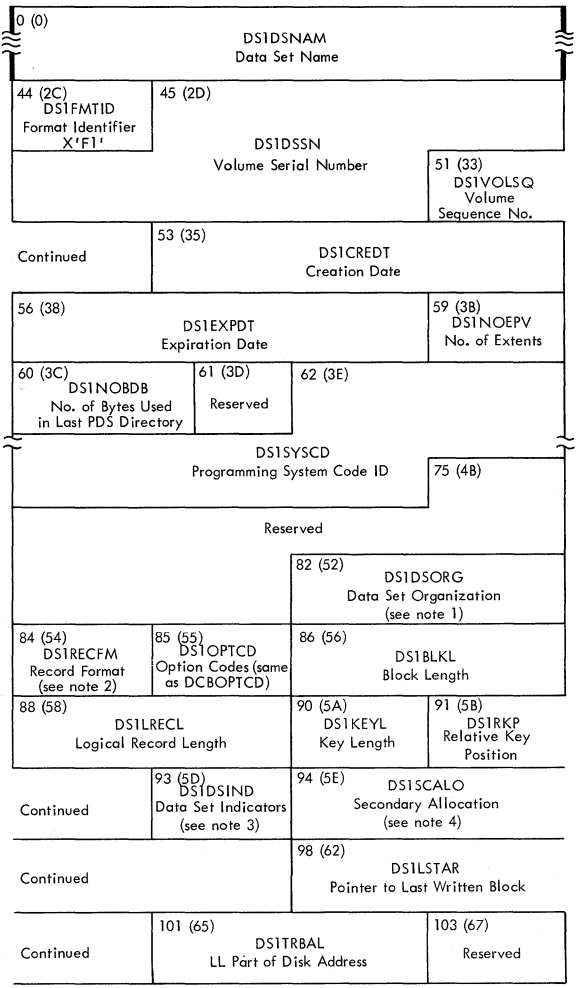
Offset	Byte Length	Field Name	Field Description, Contents, Meaning
0(0)	3	FL2LABI	Label identifier: HDR - header label. EOV - end-of-volume trailer label. EOF - end-of-data set trailer label.
3(3)	1	FL2NO	Data set label number is 2.
4(4)	1	FL2RECFM	Record format: F - fixed length. V - variable length. U - undefined length.
5(5)	5	FL2BLKL	Block length (depends on record format): F - block length. V - maximum block length. U - maximum block length.

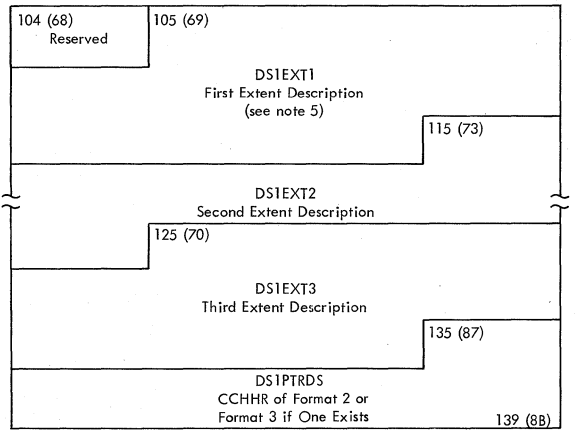
DATA SET LABEL 2 -- FL2 (Continued)

Offset	Byte Length	Field Name	Field Description, Contents, Meaning
10(A)	5	FL2LRECL	LRECL (depends on the record format): F - record length. U - zero. V unspanned } maximum record length V spanned } (up to 32,756). V spanned - 99999 (maximum record length greater than 32,756).
15(F)	1	FL2DEN	Tape density. 2400 Series magnetic tape devices: EBCDIC 7-track 9-track 0 200 bpi - 1 556 bpi - 2 800 bpi 800 3 - 1600
16(10)	1	FL2FILP	Data set position: EBCDIC 1 Volume switch previously occurred. 0 No volume switch has occurred.
17(11)	8	FL2JOBD	Job identification.
25(19)	1	FL2JSSP	Slash (/).
26(1A)	8	FL2STEPD	Step identification.
34(22)	2	FL2TRTCH	7-track 2400 Series magnetic tape devices: Cb - data conversion feature used. Eb - even parity used. Tb - BCD to EBCDIC translation required. ET - even parity and BCD to EBCDIC translation required. bb - odd parity and no translation required.
36(24)	1	FL2CNTRL	Printer control. Denotes carriage control: A - ASA control characters. M - machine control characters. b - records do not contain control characters.
37(25)	1		Reserved.
38(26)	1	FL2BLKA	Block attribute: B - blocked records. S - spanned records. R - records are both blocked and spanned. b - records are neither blocked nor spanned.
39(27)	41		Reserved (must be recorded as blanks).

DATA SET CONTROL BLOCK

DSCB - FORMAT 1





Notes:

1. DS1DSORG — Data set organization.

Byte 1

	Code	
1...	IS	Indexed sequential organization.
.1..	PS	Physical sequential organization.
..1.	DA	Direct organization.
...x xx..		Reserved bits.
.... ..1.	PO	Partitioned organization.
....1	U	Unmovable: the data contains location-dependent information.

Byte 2

xxxx xxxx — Reserved bits.

2. DS1RECFM — Record format.

	Code	
10..	F	Fixed-length record format.
01..	V	Variable-length record format.
11..	U	Undefined-length record format.
..1.	T	Track overflow.
...1	B	Blocked: may not occur with undefined (U).
.... 1...	S	Fixed length; variable length: spanned records.
.... .10.	A	ASA control character.
.... .01.	M	Machine control character.
.... .00.		No control character.
....0		Always zero.

Notes:

3. DS1DSIND — Data set indicators.

1...	Last volume on which data set resides.
..1.	Block length: multiple of 8 bytes.
...1	Data set is security-protected by a password.
.x.. xxxx	Reserved bits.

4. DS1SCALO — Secondary allocation.

Allocation parameters.
Type of request issued for the initial allocation and to be used for subsequent extensions.
Original request was:

Byte 1

00..	In tracks relative to a specific location. No secondary allocation is allowed.
01..	In blocks (physical records).
10..	In tracks.
11..	In cylinders.
..xx	Reserved bits.
.... 1...	For a contiguous extent.
.... .1..	For the maximum contiguous extent on the volume.
.... ..1.	For the five (or less) largest extents that are greater than or equal to a specified minimum.
....1	In records, to be rounded up to a cylinder boundary.

Byte 2-4 — Secondary allocation quantity.

5. DS1EXT1 — Extent description for the first extent.
This extent description is also used in format 3 and 4 DSCB's.

Data set extent type indicator.

Byte 1

00	Following 9 bytes do not indicate any extent.
01	Extent contains the data blocks.
02	Extent is an overflow area.
04	Extent is an index area.
40	First extent describes the user label extent.
80	Extent described is sharing cylinders.
81	Extent on cylinder boundaries.

Byte 2 — Extent sequence number (M)

Bytes 3-6 — Lower limit of extent (CCHH)

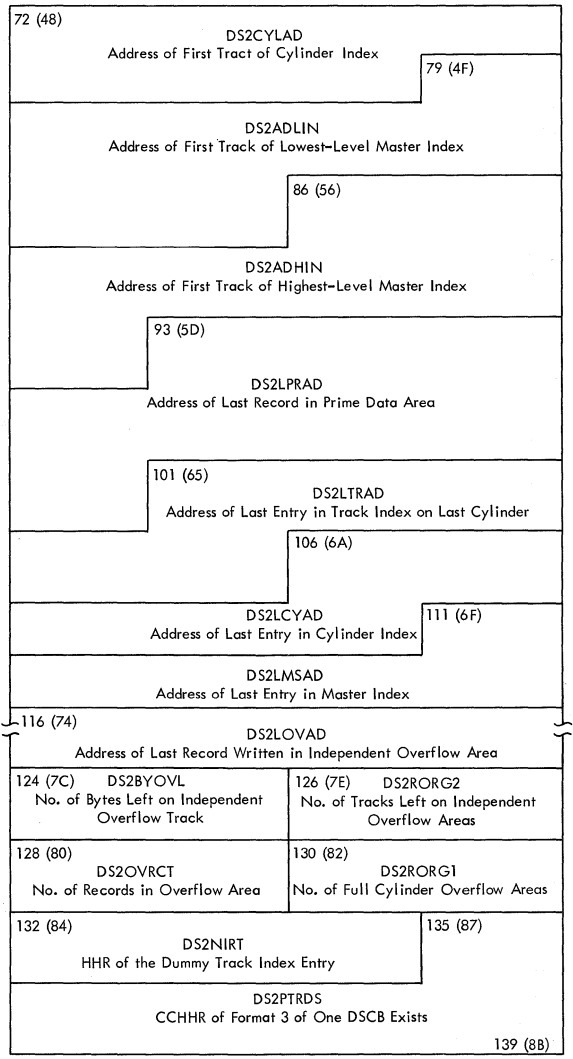
Bytes 7-10 — Upper limit of extent (CCHH)

0 (0) Hex Code X'02'	1 (1) DS22MIND Starting Address of Second-Level Master Index		
8 (8) DS2L2MEN Ending Address of Second-Level Master Index			
	13 (D) DS23MIND Starting Address of Third-Level Master Index		
20 (14) DS2L3MIN Ending Address of Third-Level Master Index			
	25 (19) Reserved		
44 (2C) DS2FMTID Format Identifier	45 (2D) DS2NOLEV No. of Index Levels	46 (2E) DS2DVIND Master Index for These Many Tracks	47 (2F) DS21RCYL HHR of First Data Record on Each Cylinder
Continued		50 (32) DS2LTCYL HH of Last Data Record on Each Cylinder	
52 (34) DS2CYLOV No. of Tracks in Overflow	53 (35) DS2HIRIN Highest R of High-Level Index	54 (36) DS2HIRPD Highest R of Prime Data	55 (37) DS2HIROV Highest R of Overflow Tracks
56 (38) DS2RSHTR Last Data Record R on Shared Track	57 (39) DS2HIRTI Highest R of Track Index	58 (3A) DS2HIIOV Fixed: Highest R for Independent Overflow Tracks Variable: Unused	59 (3B) DS2TAGDT No. of Delete Records
Continued	61 (3D) DS2RORG3 No. of References to Succeeding Overflow Records		
64 (40) DS2NOBYT No. of Bytes for Highest-Level Index		66 (42) DS2NOTRK No. of Bytes	67 (43) DS2PRCTR No. of Records in Prime Data Area
Continued			71 (47) DS2STIND Indicators (see note)

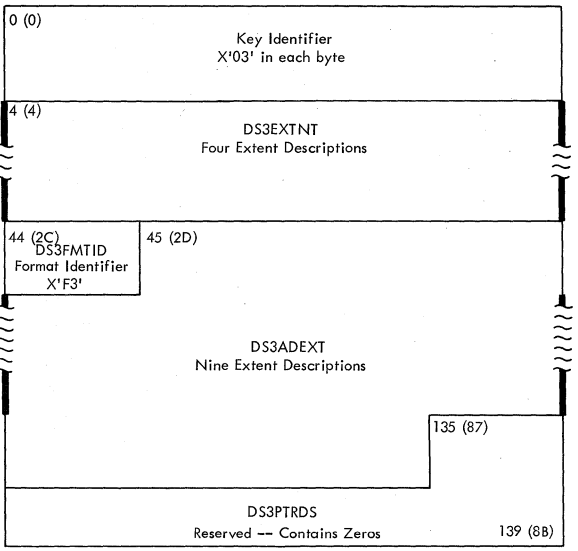
Note:

DS2STIND — Status indicators.

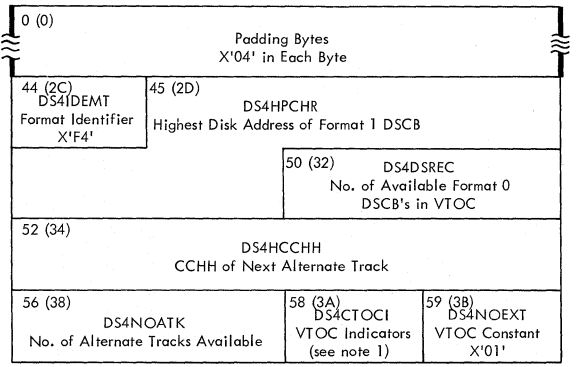
x..x xx..	Reserved bits.
.1..	Key sequence checking is to be performed.
..1.	An initial load has been completed.
.... ..1.	Last block full.
....1	Last track full.


72 (48)
DS2CYLAD
Address of First Tract of Cylinder Index
79 (4F)
DS2ADLIN
Address of First Track of Lowest-Level Master Index
86 (56)
DS2ADHIN
Address of First Track of Highest-Level Master Index
93 (5D)
DS2LPRAD
Address of Last Record in Prime Data Area
101 (65)
DS2LTRAD
Address of Last Entry in Track Index on Last Cylinder
106 (6A)
DS2LCYAD
Address of Last Entry in Cylinder Index
111 (6F)
DS2LMSAD
Address of Last Entry in Master Index
116 (74)
DS2LOVAD
Address of Last Record Written in Independent Overflow Area
124 (7C) DS2BYOVL
No. of Bytes Left on Independent Overflow Track
126 (7E) DS2RORG2
No. of Tracks Left on Independent Overflow Areas
128 (80)
DS2OVRCT
No. of Records in Overflow Area
130 (82)
DS2RORG1
No. of Full Cylinder Overflow Areas
132 (84)
DS2NIRT
HHR of the Dummy Track Index Entry
135 (87)
DS2PTRDS
CCHHR of Format 3 of One DSCB Exists
139 (8B)

DSCB - FORMAT 3

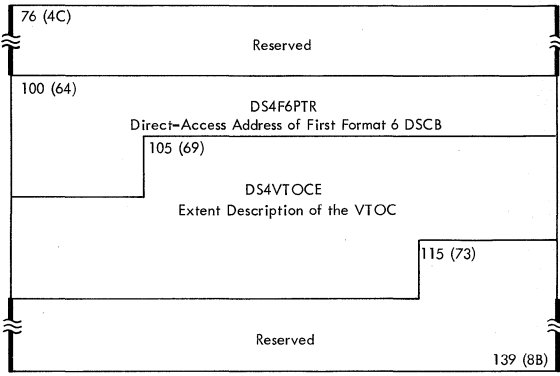


DSCB - FORMAT 4



DEVICE CONSTANTS

60 (3C) Reserved		62 (3E) DS4DEVSZ No. of Logical Cylinders or No. of Tracks	
continued		66 (42) DS4DEVTK Device Track Length	
68 (44) DS4DEVI Constant for Keyed Block	69 (45) DS4DEVL Constant for Last Block	70 (46) DS4DEVK Constant for no Key in Block	71 (47) DS4DEVFG No. of Directory Blocks Per Track (see note 2)
72 (48) DS4DEVTL Device Tolerance		74 (4A) DS4DEVDT No. of DSCB's on a Track	75 (4B) DS4DEVDB No. of Directory Blocks Per Track



Notes:

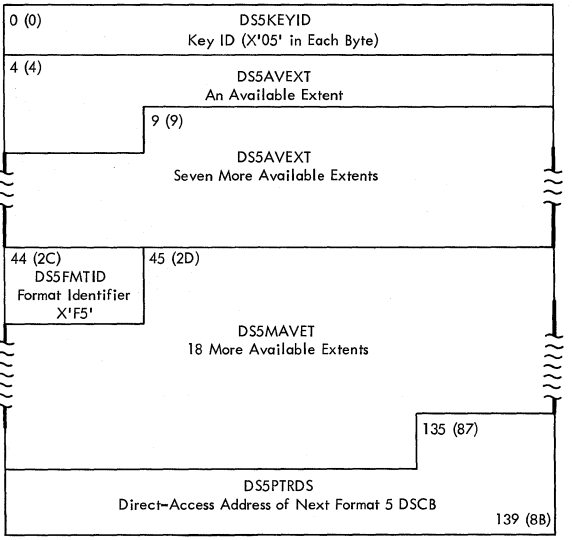
1. DS4VTOCI — VTOC indicators.

1...	Either no format 5 DSCB's exist or they do not reflect the true status of the volume.
.... 1...	Accurate format 5 and 6 DSCB's now exist and bit 0 has been turned off. This volume may contain data sets produced by IBM System/360 Disk Operating System; IBM System/360 Operating System access methods may not be able to process these data sets.
.... .1..	A DADSM function has been prematurely terminated. Possible VTOC errors exist.
.xxx ..xx	Reserved bits.

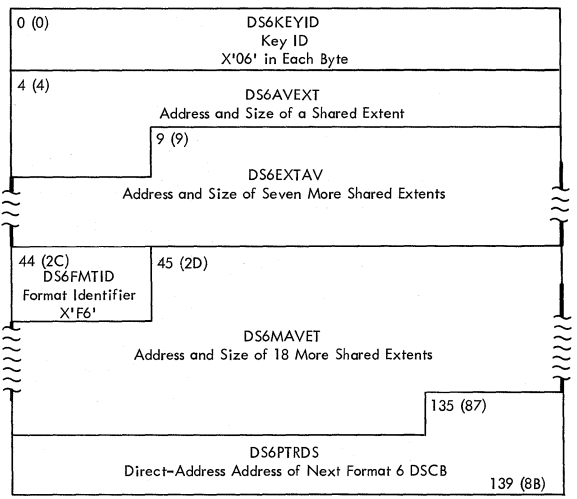
2. DS4DEVFG — Flag byte.

xxxx xxx.	Reserved bits.
....1	A tolerance factor must be applied to all but the last block of the track.

DSCB - FORMAT 5



DSCB - FORMAT 6



0 (0) LCBSTATE State of Block (see note 1)	1 (1) LCBENDOP Incoming: Contents of Reg 14, Outgoing: Address of LCB of Line
4 (4) LCBCECB Op Code	5 (5) LCBRCADD Track Address of Last Correctly Transmitted Segment

RECEIVE SCHEDULER STCB

8 (8) LCBSCHAD Address of First Waiting QTAM Subtask for This LCB	
12 (C) LCBCPRI Priority	13 (D) LCBSCHLK Link Field

16 (10) LCBCHDR Disk Address of the Current Message Header	19 (13) LCBCSEG Message Segment
Continued	22 (16) LCBNASEG Track Address of Last Message Received

Continued	25 (19) LCBSORCE Address of Head of Chain of LCB's
28 (1C) LCBMSGPR Priority	29 (1D) LCBDESTQ Address of Destination QCB
32 (20) LCBMPLRT Scan Address	33 (21) LCBCLPCI Address of Last PCI
36 (24) LCBCLCCW Address of Last BRB	
40 (28) LCBERRST Line Errors (see note 2)	42 (2A) LCBBRKCT Last Status, Time of Interruption
44 (2C) LCBTTIWD Address of Terminal Table Entry	46 (2E) LCBDLPTR Address of Next Entry in Distriblist

Comments:

Notes:

1. LCBSTATE — State of line control block.

00	Inactive.
01	Free.
02	Partial message in queue.
04	Send.
08	Receive.
10	Initiate.
20	Converse.
40	Recall.
80	Cleanup.

2. LCBERRST — Communications line error.

Byte 1

1...	Invalid destination code.
.1..	Terminal inoperative.
..1.	Sequence number high.
...1	Sequence number low.
.... x..x	Reserved bits.
.... .1..	Incomplete header.
.... ..1.	Invalid source code.

Byte 2

1...	Transmission error.
.1..	Timeout exceeded.
..1.	Breakoff error.
...1	Insufficient buffers.
.... 1...	Message not sent.
.... .xxx	Reserved bits.

Comments:

INPUT/OUTPUT BLOCK

48 (30) LCBFLAG2, IOBFLAG1 Status Bits	49 (31) LCBFLAG2, IOBFLAG2 Delay Bits (see note 1)	LCBSENSE 50 (32) IOBSENS0 SENSE Status	51 (33) IOBSENS1 SENSE Status
52 (34) LCBECBPT, IOBECBPT Not Used by QTAM			
56 (38) LCBCSW, IOBCSW Channel Status			
64 (40) LCBIOCC, IOBSIOCC SIO Condition	65 (41) LCBSTART, IOBSTART Address of First CCW		
68 (44) Reserved	69 (45) LCBDCBPT, IOBDCBPT Address of DCB		
72 (48) LCBRESTR, IOBRESTR Address of CCW for Message Transfer			
76 (4C) LCBINCAM, IOBINCAM (see note 2)		78 (4E) LCBERRCT, IOBERRCT Breakoff Counter 79 (4F)	

80 (50) LCBUCBX Index	81 (51) LCBPTEMP Message Priority	82 (52) LCBTRST Offset to EOB Character
84 (54) LCBPOLCT Count	85 (55) LCBPOLPT Address of Active Entry	
88 (58) LCBERCCW CCW Built by ERP Routine 95 (5F)		
96 (60) LCBCPA Channel Program Area		

LINE ERROR BLOCK

0 LERACTR Transmissions Counter			
4 LERACDR Data Checks Counter		6 LERACIR Interventions Counter	
8 LERACTO Timeouts Counter		10 LERTHTR Transmissions Counter	11 LERTHDC Data Check Counter
12 LERTHIR Intervention Counter	13 LERTHTO Timeout Counter	14 Reserved 15	

Notes:

1. LCBFLAG2,
   IOBFLAG2 — Flag bits.

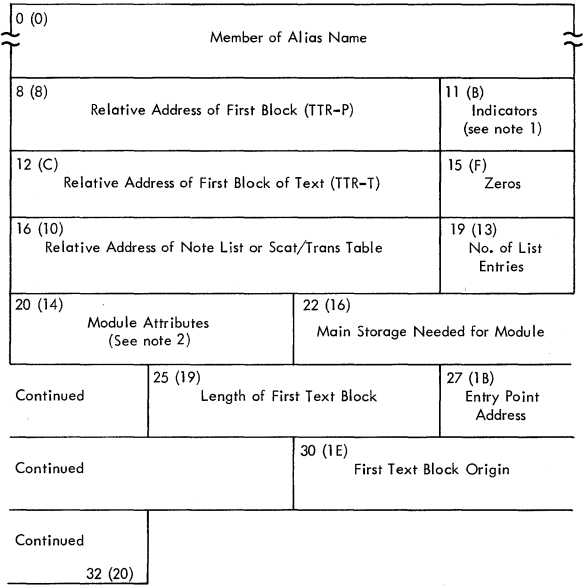
xxxx xxx.	Status bits used by the I/O Supervisor.
....x	Flag bit used by QTAM.
....1	Line is to be polled using the autopoll feature.

2. LCBINCAM,
   IOBINCAM

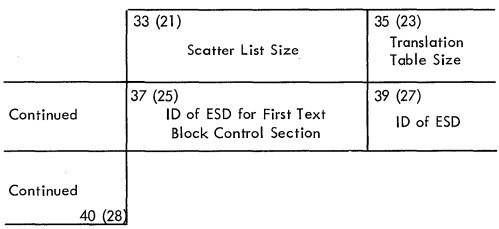
Byte 1	01	Line trying to send.
	02	Dial line not available.
	04	Polling or addressing error. WTTA:
	08	Halt I/O instruction has been used.
	10	EOT character received.
	40	WRU character received.
Byte 2	00	Always zero.

Comments:

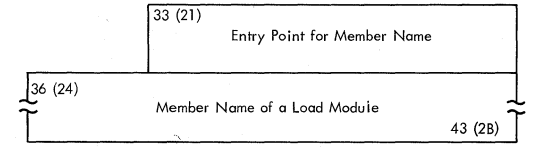
PDS DIRECTORY ENTRY
(Output From Linkage Editor)
ALL LOAD MODULES



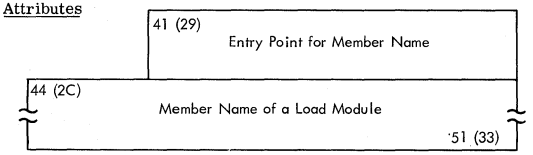
Load Modules - Scatter



Load Modules With Alias Names and RENT or REUS Attributes



Load Modules - Scatter, With Alias Names and RENT or REUS Attributes



Notes:

1.

Bit	State	Meaning
0	1	Name is an alias in the first field.
1-2	variable	Number of TTR's in the user data field.
3-7	variable	Length of user data field in halfwords.

2. Attributes

Byte 1

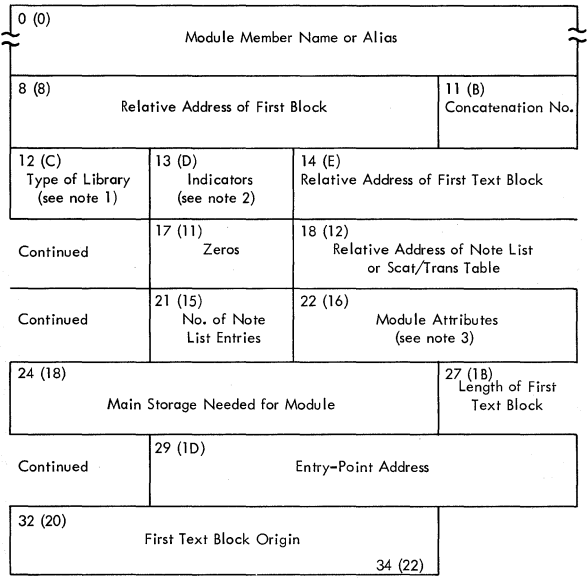
1...	Reenterable.
.1..	Reusable.
..1.	In overlay structure.
...1	Module to be tested - TESTRAN.
.... 1...	Only loadable.
.... .1..	Scatter format.
.... ..1.	Executable.
....1	Module contains no RLD items and only one block of text.
....0	Module contains multiple records with at least one block of text.

Byte 2

1...	Module can be processed only by F-level of Linkage Editor.
0...	Module can be processed by all levels of Linkage Editor.
.1..	Linkage Editor assigned origin of first text block is zero.
.0..	Linkage Editor assigned origin of first text block is not zero.
..1.	Entry point assigned by Linkage Editor is zero.
...1	Module contains no RLD items.
.... 1...	Module cannot be reprocessed by Linkage Editor.
.... .1..	Module contains TESTRAN symbol cards.
.... ..1.	Module created by Linkage Editor F.
....1	Refreshable module.

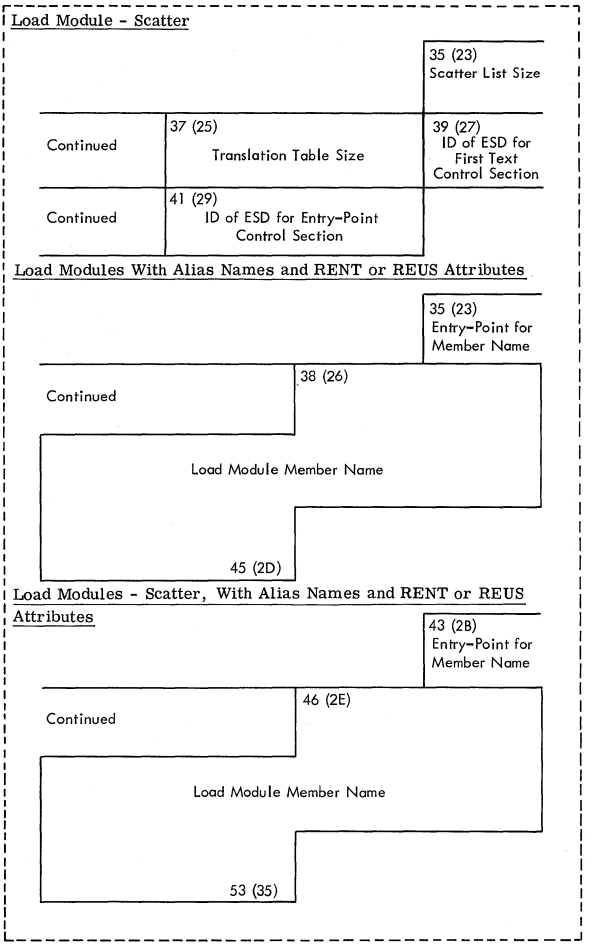
PDS DIRECTORY ENTRY (Continued)

ALL LOAD MODULES (After BLDL)



Note: PDS entry after BLDL is the same as before BLDL except that bytes 11 (B) and 12 (C) have been added. Therefore, all following fields are displaced by 2 bytes.

Comments:


Load Module - Scatter
35 (23)
Scatter List Size
Continued
37 (25)
Translation Table Size
39 (27)
ID of ESD for First Text Control Section
Continued
41 (29)
ID of ESD for Entry-Point Control Section
Load Modules With Alias Names and RENT or REUS Attributes
35 (23)
Entry-Point for Member Name
Continued
38 (26)
Load Module Member Name
45 (2D)
Load Modules - Scatter, With Alias Names and RENT or REUS Attributes
43 (2B)
Entry-Point for Member Name
Continued
46 (2E)
Load Module Member Name
53 (35)

Notes:

1. Library

This byte is normally zeros. If the DCB operand in the BLDL macroinstruction was specified as zero, this byte contains a 1 if the name was found in the link library, and a 2 if the name was found in the job library.

2.

Bit	Setting	Meaning
0		Name is an alias in the first field.
1-2	variable	Number of TTR's in the user data field.
3-7	variable	Length of user data field in halfwords.

3. Attributes

Byte 1

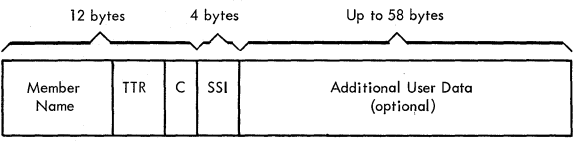
1...	Reenterable.
.1..	Reusable.
..1.	In overlay structure.
...1	Module to be tested - TESTRAN.
.... 1...	Only loadable.
.... .1..	Scatter format.
.... ..1.	Executable.
....1	Module contains no RLD items and only one block of text.
....0	Module contains multiple records with at least one block of text.

Byte 2

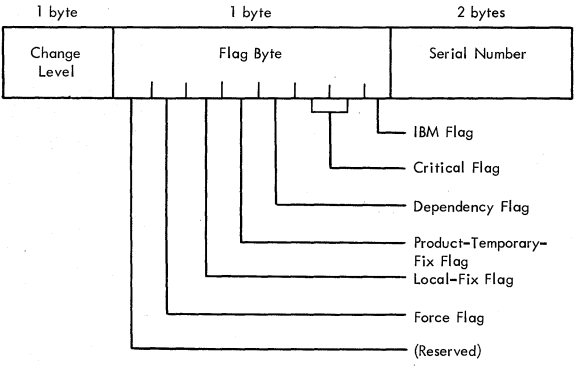
1...	Module can be processed only by F level of Linkage Editor.
0...	Module can be processed by all levels of Linkage Editor.
.1..	Linkage Editor assigned origin of first block of text is zero.
.0..	Linkage Editor assigned origin of first block of text is not zero.
..1.	Entry point assigned by Linkage Editor is zero.
...1	Module contains no RLD items.
.... 1...	Module cannot be reprocessed by Linkage Editor.
.... .1..	Module contains TESTRAN symbol cards.
.... ..1.	Module created by Linkage Editor F.
....1	Refreshable module.

SYSTEM STATUS INDEX

SSI Bytes in Macro and Symbolic Libraries



Format of SSI Bytes



Critical Flag:
00 - Not critical.
01 - Might require complete regeneration.
10 - Might require partial regeneration.
11 - Reserved for future use.

SEGMENT TABLE

0 (0) TEST Ind: Bit 1 = 0: Not in Test; Bit 1 = 1: In Test	1 (1) Address of Data Control Block (DCB) Used to Load Module *		
4 (4) 0	5 (5) Address of Note List *		
8 (8) Last Segment Number of Region 1	9 (9) Highest Segment No. in Storage-Region 1	10 (A). Last Segment Number of Region 2	11 (B) Highest Segment No. in Storage-Region 2
12 (C) Last Segment Number of Region 3	13 (D) Highest Segment No. in Storage-Region 3	14 (E) Last Segment Number of Region 4	15 (E) Highest Segment No. in Storage-Region 4
16 (10) Address of ECB to be Posted When SEGLD Request has been Serviced *			
20 (14) Reserved *			
24 (18) Previous Segment Number for Segment 1	25 (19)		Status Indctr
28 (1C) Previous Segment Number for Segment 2	29 (1D) Address of Entry Table Entry (When Caller Chain Exists) *		Status Indctr
Previous Segment Number for Segment N	Address of Entry Table Entry (When Caller Chain Exists) *		Status Indctr

4 bytes

Comments:

TEST indicator:
Specifies that this module is "under test" using TESTRAN. Initialized by program fetch routine.

Highest segment number in storage:
Initially set to 00 except for region 1 which is initially set to 01 by Linkage Editor.

Status indicator:
Indicates the status of this segment, with the last two bits of the entry table address field as follows:

00 -- segment is in main storage as a result of a branch to the segment.
10 -- segment is in main storage; no caller chain exists.
01 -- segment is not in main storage, but is scheduled to be loaded.
11 -- segment is not in main storage.

The status indicator for segment 1 is initially set to 10. All others are initially set to 11.

*Set to zero by Linkage Editor.

Note: "Region" refers to the regions of a multiregion overlay structure, not to a job-step's region of main storage (see Systems Reference Library, OS Linkage Editor, GC28-6538).

Comments:

ENTRY TABLE

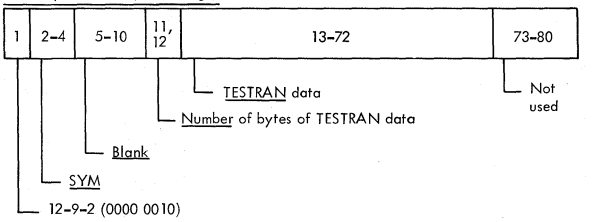
	0 (0) Unconditional Branch to Last Entry-BC 15, DISP (15,0)		4 (4) Address of symbol referred to	8 (8) "To" Seg Number	9 (9) Previous Caller (Initially Zero)
	12 (C) Unconditional Branch to Last Entry-BC 15, DISP (15,0)		16 (10) Address of symbol referred to	20 (14) "To" Seg Number	21 (15) Previous Caller (Initially Zero)
	Unconditional Branch to Last Entry-BC 15, DISP (15,0)		Address of symbol referred to	"To" Seg Number	Previous Caller (Initially Zero)
Last Entry	SVC 45 Instruction	L 15,4(0, 15) Loads GR15 with the Value of the ADCON	BCR 15, 15	"From" Seg No.	Address of Segment Table (SEGTAB)
	←2 bytes→	←2 bytes→	←2 bytes→	←2 bytes→	←1 byte→ ←3 bytes→

Note: DISP is the displacement, in bytes, of this entry from the last entry. "to" segment number is the number of the segment containing the symbol referred to. "from" segment number is the number of the segment that contains this entry table.

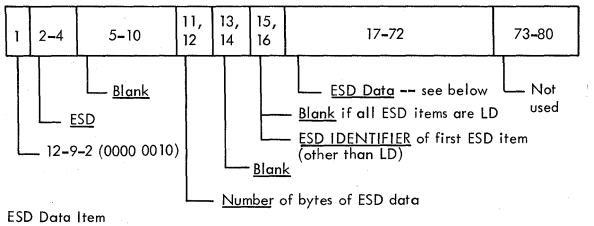
Comments:

RECORD FORMATS - INPUT TO LINKAGE EDITOR

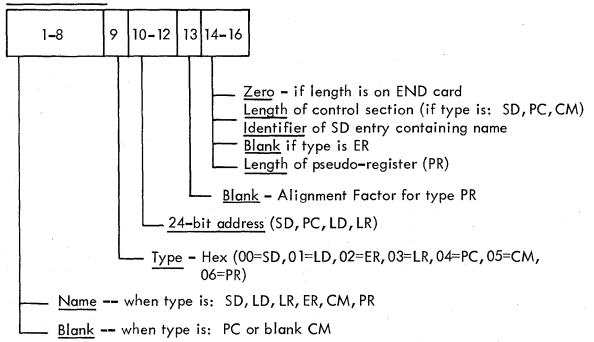
SYM Input Record (Card Image)



ESD Input Record (Card Image)



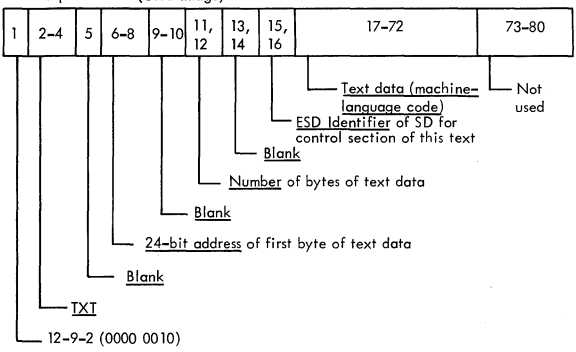
ESD Data Item



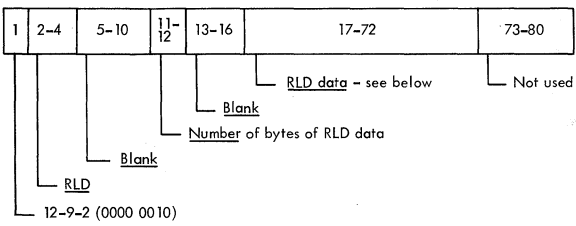
Note:

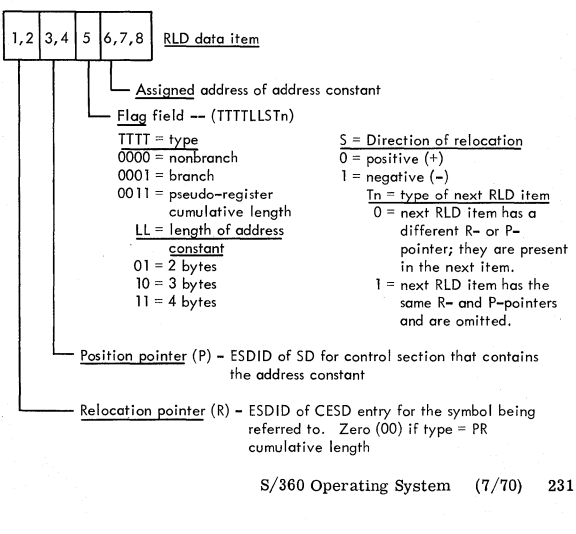
SD = Section Definition
LD = Label Definition
ER = External Reference
LR = Label Reference
PC = Private Code
CM = Common
PR = Pseudo - Register

TEXT Input Record (Card Image)

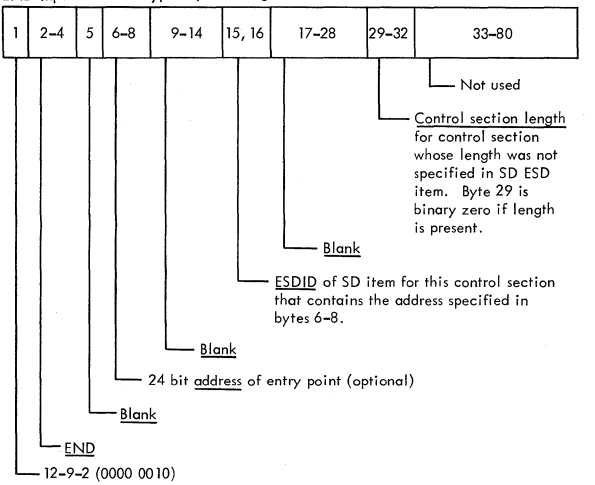


RLD Input Record (Card Image)

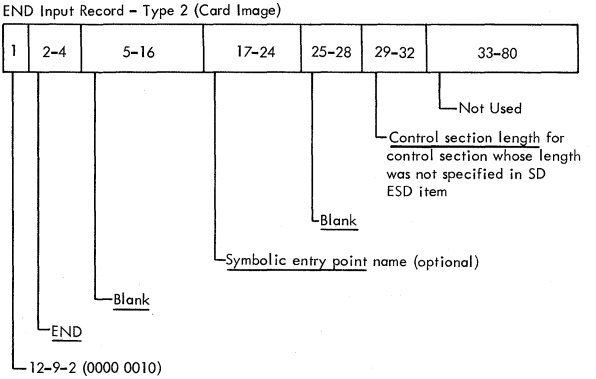




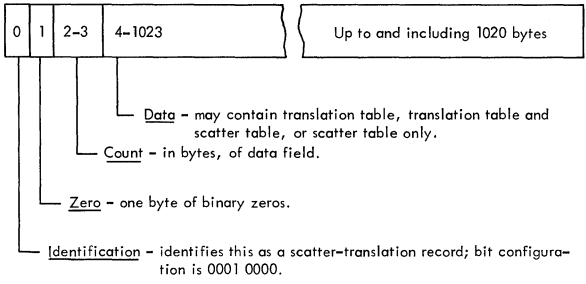
END Input Record – Type 1 (Card Image)



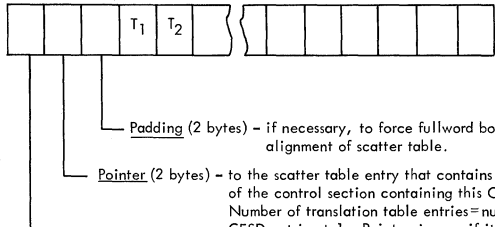
END Input Record – Type 2 (Card Image)



SCATTER/TRANSLATION RECORD

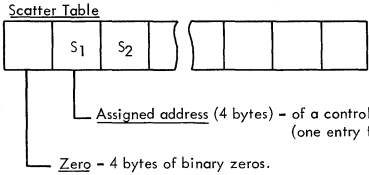


Translation Table

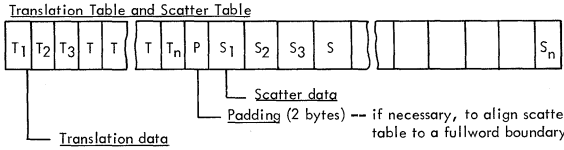


Note: One 2-byte entry for each external symbol.

Scatter Table



Translation Table and Scatter Table



Note: Translation table follows extent list in main storage. Translation table entries are two bytes in length; scatter table entries are four bytes in length.

Legend for Types of Entries in Composite External Symbol Dictionary (CESD)

SD = section definition
LR = label reference
PC = private code
CM = common

CONTROL RECORD

Length of control section - specifies the length of the control section (in bytes) to which the text in the following record belongs (2 bytes).

CESD entry number - specifies the composite external symbol dictionary entry that contains the control section names of the control section that contains this text (2 bytes)

Channel Command Word (CCW) - could be used to read the text record that follows. The data address fielc contains the Linkage Editor assigned address of the first byte of text in the text record that follows (8 bytes).

Count - contains two bytes of binary zeros. The count field contains the length of the record.

Count - in bytes of the control information (CESD ID, length of control section) following the CCW field (2 bytes).

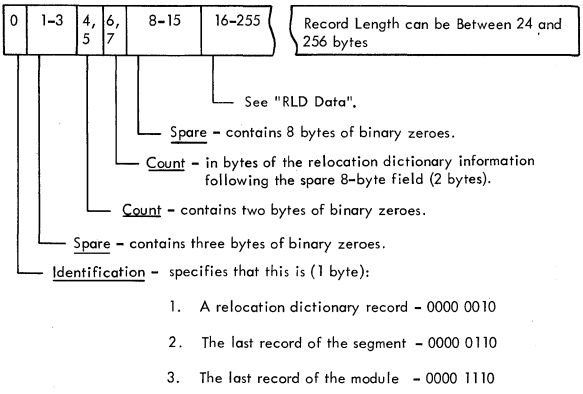
Spare - contains three bytes of binary zeros.

Identification - specifies that this is (1 byte):

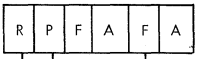
1. A control record - 0000 0001
2. The control record that precedes the last text record of this overlay segment - 0000 0101
3. The control record that precedes the last text record of the module - 0000 1101

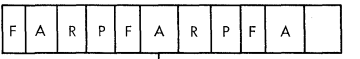
Comments:

RELOCATION DICTIONARY (RLD) RECORD



Comments:





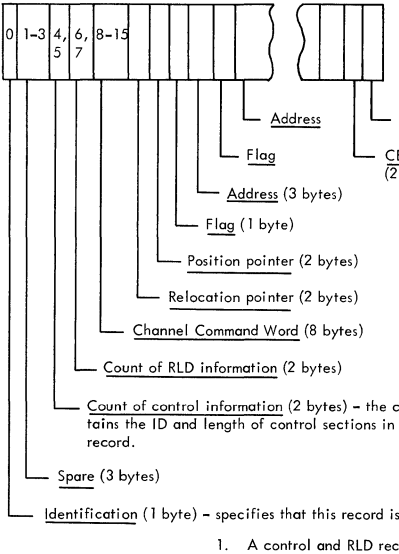
Address - Linkage Editor assigned address of the address constant (3 bytes).

Flag - specifies miscellaneous information as follows:
(1 byte -- when byte format is xxxxLIST):
xxxx specifies the type of this RLD item (address constant)
0000 -- nonbranch type in assembler language, a DC A (name)
0001 -- branch type (in assembler language, a DC V (name)
0010 -- pseudo-register displacement value
0011 -- pseudo-register cumulative displacement value
1000 and 1001 -- this address constant is not to be relocated because it refers to an unresolved symbol.
LL specifies the length of the address constant
01 -- two byte
10 -- three byte
11 -- four byte
S specifies the direction of relocation
0 -- position
1 -- negative
T specifies the type of RLD item following this one
0 -- the following RLD item has a different relocation and/or position pointer
1 -- the following RLD item has the same relocation and position pointers as this one, and is omitted.

Position pointer - contains the entry number of the CESD entry (or translation table entry) that indicates in which control section the address constant is (2 bytes).

Relocation pointer - contains the entry number of the CESD entry (or translation table entry) that indicates the value of the symbol to be used in the computation of the value of the address constant (2 bytes).

CONTROL AND RELOCATION DICTIONARY RECORD



1. A control and RLD record - 0000 0011
2. A control and RLD record that is followed by the last text record of a segment - 0000 0111
3. A control and RLD record that is followed by the last text record of a module - 0000 1111

Note: For detailed descriptions of the data fields see "Relocation Dictionary Record", and "Control Record".

The record length varies from 20 to 260 bytes.

Comments:

PROGRAM FETCH WORK AREA --

(DISPLACEMENTS IN BYTES) (PCI)

Displacement	Definition	Length
0 (0)	IOB	8 fullwords
32 (20)	IOB Seek Address	2 fullwords
40 (28)	Seek Buffers (4)	12 fullwords
88 (58)	Search and TIC CCW's	3 doublewords
112 (70)	RLD Buffer 1	33 doublewords
376 (178)	Channel Program 1	5 doublewords
416 (1A0)	RLD Buffer 2	33 doublewords
680 (2A8)	Channel Program 2	5 doublewords
720 (2D0)	RLD Buffer 3	33 doublewords
984 (3D8)	Channel Program 3	5 doublewords
1024 (400)	I/O ECB	1 fullword
1028 (404)	ECB	1 fullword
1032 (408)	Buffer Table Pointer	2 fullwords
1040 (410)	Buffer Table	9 fullwords
1076 (434)	Register Save Area	16 fullwords
1140 (474)	Address of Translation Table	1 fullword
1144 (478)	Address of Scatter List	1 fullword
1148 (47C)	Address of R-Pointer	1 fullword
1152 (480)	Address of P-Pointer	1 fullword
1156 (484)	Boundary Word for Relocation	1 fullword
1160 (488)	Fetch Flags	2 fullwords
1168 (490)	ECB List	2 fullwords
1176 (498)	Last Table Entry	1 fullword

DESCRIPTION OF FETCH FLAGS

Byte	Content	Meaning
0		Reserved.
1	FF	Program is being scatter-loaded.
	00	Program is being block-loaded.
2	FF	All buffers are full.
	0F	Channel-end appendage routine is unable to restart a channel program because all buffers were full when the channel-end interruption occurred.

PROGRAM FETCH BUFFER TABLE

0 (0) Buffer Code	1 (1) Pointer to Next Entry (12)	4 (4) TIC Command	5 (5) Address of Channel Program 2	8 (8) Zero	9 (9) Address of Buffer 1
12 (C) Buffer Code	13 (D) Pointer to Next Entry (24)	16 (10) TIC Command	17 (11) Address of Channel Program 3	20 (14) Zero	21 (15) Address of Buffer 2
24 (18) Buffer Code	25 (19) Pointer to First Entry (0)	28 (1C) TIC Command	29 (1D) Address of Channel Program 1	32 (20) Zero	33 (21) Address of Buffer 3

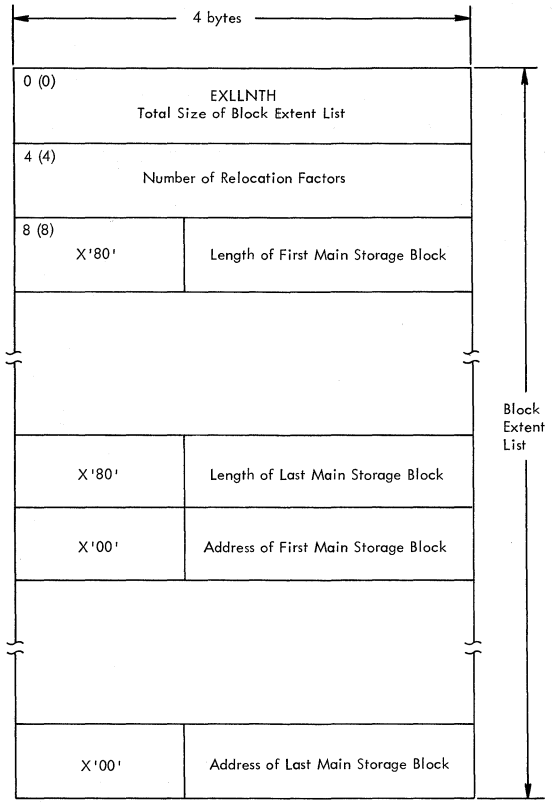
Note: Each entry contains 12 bytes.

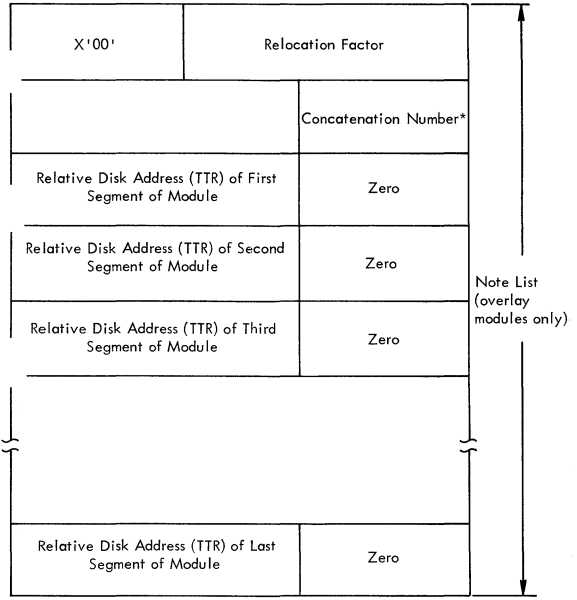
DESCRIPTION OF BUFFER CODES

Content	Meaning
00	Buffer Empty
80	Buffer Full

Comments:

BLOCK EXTENT LIST AND NOTE LIST

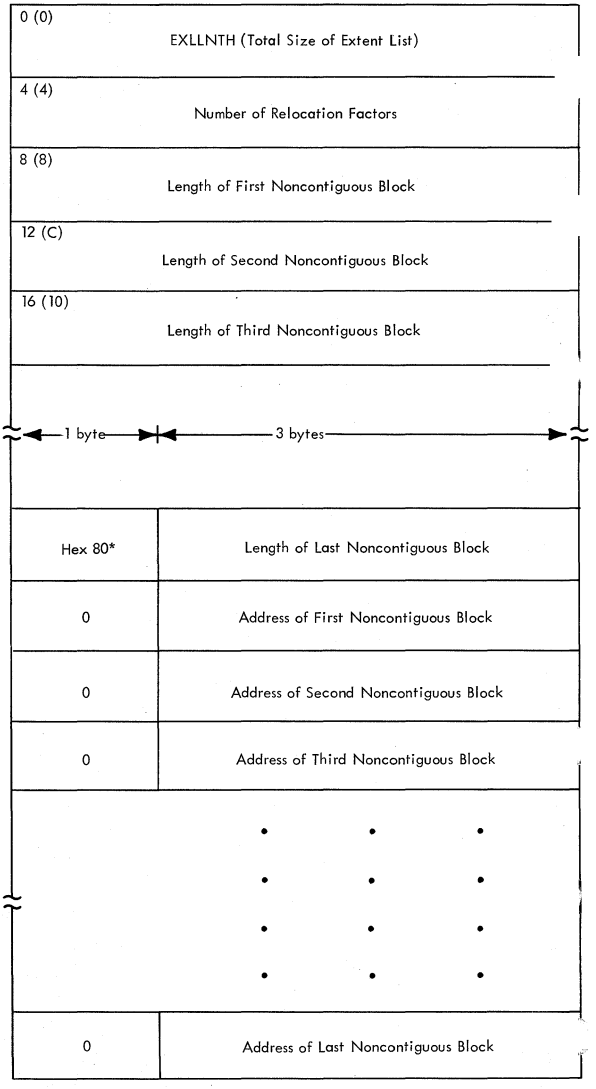




*Concatenation number is a value that specifies the sequential position of this data set in a group of concatenated data sets.

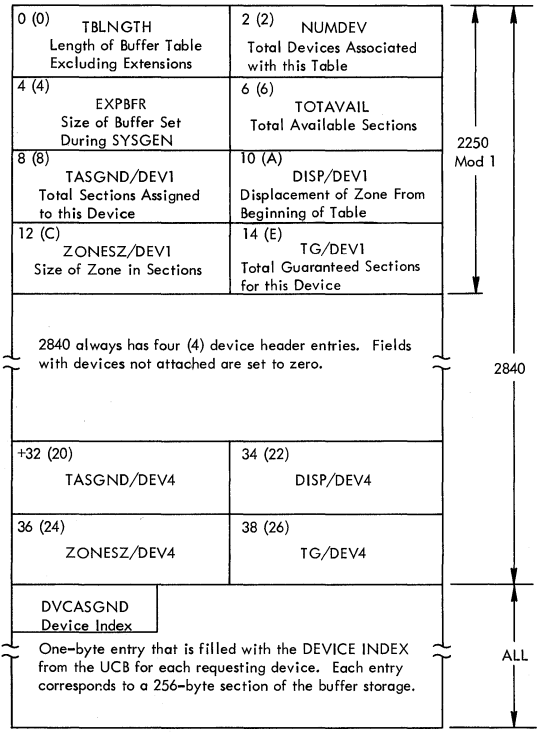
Comments:

SCATTER EXTENT LIST



*Indicates the end of the immediately preceding length-of-block list.

BUFFER TABLE -- GAM



0 (0) Com Area Address (User-Specified)		
4 (4) DCB Address (User-Specified)		
8 (8) PFMSK (User-Specified)		
12 (C) ATTNTYP (User-Specified)		
16 (10) EP1 (Entry Point of User's Attention Routine)		
20 (14) EP2 (Internal Use of ATTNINQ MODE = R)		
24 (18) SAVE13 (Save Area Pointer for ATTNINQ)		
28 (1C) PFKMSK Save Area		
32 (20) ATTNTYP Save Area		
36 (24) ECB (Used by ATTNINQ MODE = W)		
40 (28) Associated REB Address		
44 (2C) 2260 Offset	45 (2D) LP Restart	Flags
48 (30) ATTNINQ Address		
52 (34) Reserved		55 (37)

OACB - OUTPUT AREA CONTROL BLOCK

0 (0) SLOA Starting Location of Output Area
4 (4) LOA Length of Output Area
8 (8) AORP Address of Overflow Routine
12 (C) CRSA Current Routine Start Address
16 (10) OLP Order Load Point
20 (14) BLP Buffer Load Point 23 (17)

OCBP - OUTPUT CONTROL BLOCK POINTER

0 (0) OACB Pointer
4 (4) Work Area Pointer

Comments:

REB - ROUTINE ENTRY BLOCK

0 (0)	RTNF Pointer to Next Lower REB (Zeros if None Lower)	
4 (4)	RTNB Pointer to Next Higher REB or to TE if Last REB	
8 (8)	RTNUCB Address of UCB or Pointer to a List of UCB's	
12 (C)	RTNGACB Address of the Associated GACB	
16 (10)	RTNIRB Address of Associated IRB	
20 (14)	RTNFLGS Status of REB	22 (16) PRTY Attention Routine Priority
24 (18)	RTNQ1 Address of an IQE for the Internal Data Queue; When EP = 0 in GACB	
28 (1C)	RTNQ2 Address of the Next IQE for the Internal Data Queue	
32 (20)	RTNTCB Address of the TCB Associated with this REB	
36 (24)	Reserved	39 (27)

Comments:

TE - TASK ENTRY BLOCK

0 (0)	Reserved
4 (4)	TEREB Address of REB That Points to This TE
8 (8)	TETCB Address of TCB
12 (C)	TECAN Indicates Control Function of CANCEL Key Operation
16 (10)	TEUSECNT Number of UCB's Currently Open for This TE
20 (14)	TEFLGS Status of TE
24 (18)	TEGARIRB Associated IRB for the GAR Routine
28 (1C)	TEGEIR Address of Graphic Entry Interface Routine 31 (1F)

Comments:

PIB - PARTITION INFORMATION BLOCK

0 (0) CSCB Address of Pending Command	
4 (4) ECB Address ECB to be Posted When Partition is Quiesced for Redefinition	
8 (8) "No Work" ECB for the Initiator	
12 (C) Status Bits - A (See note 1)	13 (D) Address of Current Job Step CSCB
16 (10) Status Bits - B (See note 2)	17 (11) SPIL Address (See note 3)
20 (14) CSCB Address of Current Task in Partition	
24 (18) Protection Key	25 (19) Job Class Codes
28 (1C) CSCB Address of Suspended Reader	
32 (20) Direct SYSOUT Control Block Chain Pointer DSOCB	
36 (24) Internal Queue Status Bits (See note 4)	37 (25) Address of Internal Queue of Job Names to be Restarted
40 (28) Job Step Timing Status Bits (See note 5)	41 (29) Address of Job Step TQE
44 (2C) Count Active Subtasks	45 (2D) Address of RB, Most Recently Loaded Module JBAQ

Notes:

1. Status Bits A

0...	Stop initiator.
1...	START INIT issued.
.1..	Partition active.
..1.	Pending command.
...1	Transient reader operating.
.... 1...	Partition to be terminated by IEFSD599.
.... .1..	Partition involved in redefinition.
.... ..1.	System assigned transient reader in this partition.
....1	Problem program is running.

2. Status Bits B

1...	Logical tracks added for initiator.
.1..	LOT block exists.
..1.	SPIL has been created.
.... 1...	Unending task present in partition.
...x .xxx	Reserved bits.

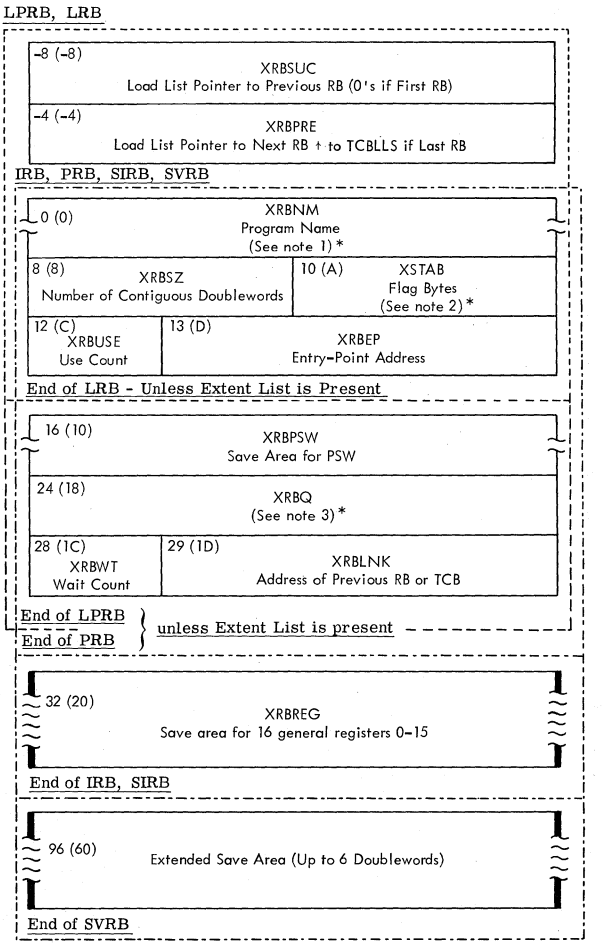
3. Job class codes: Contains one to three codes for the partition, arranged in descending numerical order.

4. Status Bits — Internal queue.

1...	A large partition in which the DSDR processing step for a small partition is to be executed.
.1..	A restart reader has been started in place of a user-assigned reader.
..1.	A DEFINE command has been received and the partition is processing jobs on its internal queue.
...x xxxx	Reserved bits.

5. Status Bits — Job step timing.

1...	Job step TQE is being used for job step timing.
.1..	Indicates to INIT that the step being terminated was timed.
..xx xxxx	Reserved bits.



*See notes under "Program Extent List (LRB, LPRB, PRB)".

REQUEST ELEMENT TABLE -- 12 STAR

The elements in the request element table are used by the I/O supervisor to represent active or queued I/O requests. The unused elements in the table are available for incoming I/O request representation.

The request element table has the following characteristics:

1. Creation: The table is created at system generation time.

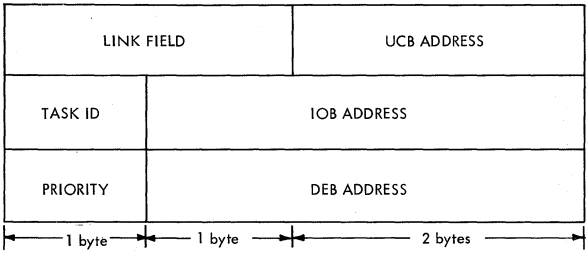
2. Storage Area: It resides, as a permanent part of the resident supervisor, in protected resident storage (when protection is available).

3. Size: The total number of request elements in the table is defined at system generation time. The request element table for a system in which MVT is excluded contains a 12-byte request element for the maximum number of I/O requests expected at any one time; and for a system in which MVT is included, a 16-byte request element.

4. Means of Access: The active request elements are addressed by the LAST REQUEST field in the associated UCB. The available request elements are contained in the freelist, which is addressed by the freelist pointer in the CVT. The queued request elements are within the particular logical channel queue referred to by the logical channel word.

5. Format: The I/O supervisor is concerned with all information in a request element. The format of a 12-byte and 16-byte request element is as follows:

Format of a 12-byte Request Element



REQUEST ELEMENT TABLE -- 12 STAR (Continued)

LINK FIELD (2 bytes)
This is a 2-byte link field used to link the request elements that are members of a particular queue or belong to the freelist.

UCB ADDRESS (2 bytes)
This field addresses the UCB associated with the queued I/O request.

TASK ID (1 byte)
This byte contains the task control block identification of the task that originally initiated the I/O request.

IOB ADDRESS (3 bytes)
This field contains the address of the IOB associated with the I/O request.

PRIORITY (1 byte)
This byte contains the priority of the I/O request represented by this request element. The priority is assigned at open time according to the priority of the associated task.

DEB ADDRESS (3 bytes)
This field contains the address of the DEB associated with the data set for this I/O request.

SPIL - SMALL PARTITION INFORMATION LIST

0 (0) (ECBA) Event Control Block	
4 (4) (ECBB) Event Control Block	
8 (8) (ECBC) Event Control Block	
12 (C) Address of Small Partition TCB	
16 (10) Status Bits (See note)	17 (11) Reserved
20 (14) Address of Allocate Parameter List (In Large Partition) if a Problem Program; TIOT, if a Reader or Writer	
24 (18) Address of CSCB for Writer	
28 (1C) ECB List for DEQUEUE	
68 (44) Address of LINK Parameter List (In Large Partition)	
72 (48) Address of 3-Word Parameter List for IEESD590 and IEESD591	
76 (4C) Step Time Remaining for Problem Program Executing in a Small Partition	

Note:

Status Bits

1...	A START writer command has been entered.
.1..	A START reader command has been entered.
..1.	A SPIL pointer has been stored in the PIB.
...1	Problem program has requested termination.
.... 1...	Indicative dump was requested.
0000 0000	START INIT was entered.

-32 (-20)	TCBFRS Floating-Point Register Save Area
0 (0)	TCBRBP Address of RB
4 (4)	TCBPIE Address of Program Interrupt Element
8 (8)	TCBDEB Address of DEB Queue
12 (C)	TCBTIO Address of Task I/O Table
16 (10)	TCBCMP Task Completion Code (See note 1)
20 (14)	TCBTRN Flag, Address of Control Core Table (TESTRAN) (See note 2)
24 (18) Reserved	25 (19) TCBMSS Address of Boundary Box
28 (1C) TCBPKF Protection Key XXXX 0000	29 (18) TCBFLGS Task End, Miscellaneous, and Dispatchability Flags (See note 3)
	34 (22) TCBLMP Enqueue Count 35 (23) TCBDSP Dispatching Priority
36 (24)	TCBLLS Address of Last RB for Program Loaded by LOAD
40 (28)	TCBJLB Address of JOBLIB DCB
44 (2C)	Reserved

48 (30)	TCBGRS General Register Save Area
112 (70) TCBIDF TCB Identifier	113 (71) TCBFSA Address of First Program Save Area
116 (74)	TCBTCB Zeros
120 (78)	TCBTME Address of Timer Element
124 (7C)	Reserved
128 (80)	Reserved (Note 5)
132 (84)	Reserved (Note 5)
136 (88)	Reserved (Note 5)
140 (8C)	Reserved (Note 5)
144 (90)	Reserved (Note 5)
148 (94)	Reserved (Note 5)
152 (98)	Reserved (Note 5)
156 (9C)	Reserved (Note 5)

160 (A0) TCBNSTAE STAE Flags Address of Current STAE Control Block	
164 (A4) Reserved	
168 (A8) TCBUSER User Field	
172 (AC) TCBDAR DAR Flags (See note 4)	173 (AD) Reserved
176 (B0) Reserved	
180 (B4) Reserved	181 (B5) TCBJSCB Address of the JSCB Minus 252

Notes:

1. Byte 1 — A flag byte field containing indicators used or set by the ABEND SVC.

1...	A dump has been requested.
.1..	Presently reserved, but set to indicate step ABEND for MVT compatability (see MVT use of this bit).
..1.	Some problem storage was overlaid by the second load of ABEND. A first load overlay is indicated in TCBFLGS field.
...x	Reserved bit.
.... 1...	A double ABEND has occurred.
.... .1..	A dump message (WTO) is to be issued to the operator.
.... ..1.	Scheduler is to print an indicative dump.
....1	An ABEND message is provided that may be printed by ABDUMP.

Bytes 2-4 — System completion code in first 12 bits; user completion code in last 12 bits.

2. TCBTRN — A byte used for flags as described.

...x xxxx	Reserved bits.
1...	Both TESTRAN and decimal simulator programs being used on a Mod 91 machine.
.1..	Suppresses taking checkpoints for this step.

Notes:

3. TCBFLGS — Flag byte fields.

Byte 1

1...	Abnormal termination in progress.
.1..	Normal termination in progress.
..1.	ABEND was initiated by the resident abnormal termination routine.
...1	Recursion through ABEND is permitted.

Byte 2

1...	System task: ABEND prohibited for this task.
.xxx x.xx	Reserved bits.
.... .1..	Dump processing has been initiated in ABEND.

Byte 3

xx.x ...x	Reserved bits.
..1.	Exit effector: System error routines already operating for this task.
.... 1...	Floating-point registers exist.
.... .1..	Job scheduler routines in process.
.... ..1.	XCTL routine is changing the storage protection key in the PSW from zero to the one used by the problem program.

Byte 4 — Reserved.

Byte 5 — Reserved.

4. TCBDAR — Damage assessment routine (DAR) flags.

1...	Primary DAR recursion - DAR failure while writing core image dump.
.1..	Secondary DAR recursion - DAR failure while attempting to reinstate failing region/partition.
..1.	Only a dump has been requested.
...1	A recursion is permitted in CLOSE after DAR processing is completed.
.... 1...	Problem program storage has been overlaid to process DAR.
.... .xxx	Reserved bits.

5. Bytes — 128 (80) to 159 (9F) are overlayed by other system control blocks to save main storage space.

-32 (-20)	TCBFRS Floating-Point Register Save Area
0 (0)	TCBRBP Address of RB
4 (4)	TCBPIE Address of Program Interrupt Element
8 (8)	TCBDEB Address of DEB Queue
12 (C)	TCBTIO Address of Task I/O Table
16 (10)	TCBCMP Task Completion Code (See note 1)
20 (14)	TCBTRN Flag, Address of Control Core Table (TESTRAN) (See note 2)
24 (18) Reserved	25 (19) TCBMSS Address of Boundary Box
28(1C) TCBPKF Protection Key XXXX 0000	29 (1D) TCBFLGS Task End, Miscellaneous, and Dispatchability Flags (See note 3)
	34 (22) TCBLMP Enqueue Count 35 (23) TCBDSP Dispatching Priority
36 (24)	TCBLLS Address of Last RB for Program Loaded by LOAD
40 (28)	TCBJLB Address of JOBLIB DCB
44 (2C)	TCBFTJST Address of the Job Step TCB
48 (30)	TCBGRS General Register Save Area
112 (70) TCBIDF TCB Identifier	113 (71) TCBFSA Address of First Program Save Area

116 (74) TCBTCB Address of Next Lower Priority TCB	
120 (78) TCBTME Address of Timer Element	
124 (7C) TCBPIB Partition Type and Address of PIB (See note 4)	
128 (80) TCBNTC Address of Previous TCB on Subtask Queue (Sister) (See note 8)	
132 (84) TCBOTC Address of Originating TCB (Mother) (See note 8)	
136 (88) TCBLTC Address of Last TCB on Subtask Queue (Daughter) (See note 8)	
140 (8C) TCBIQE Address of IQE for ETXR Routine (See note 8)	
144 (90) TCBECB Address of ECB Posted on Task Completion (See note 8)	
148 (94) Reserved (See note 8)	
152 (98) TCBFTLMP Limit Priority	153 (99) TCBFTFLG Flag Bytes (See note 5)
156 (9C) Reserved (See note 8)	
160 (A0) TCBNSTAE STAE Flags Address of Current STAE Control Block	
164 (A4) Reserved	165 (A5) TCBTCT Address of the TCT

168 (A8) TCBUSER User Field	
172 (AC) TCBDAR DAR Flags (See note 6)	173 (AD) TCBNDSP Secondary Nondispatchability Bits (See note 7)
176 (B0) Reserved	
180 (B4) Reserved	181 (B5) TCBJSCB Address of the JSCB Minus 252

Notes:

1. TCBCMP — Task completion code.

Byte 1	A flag byte field containing indicators used or set by the ABEND SVC.
1...	A dump has been requested.
.1..	Presently reserved, but set to indicate step ABEND for MVT compatability (see MVT use of this bit).
..1.	Some problem program storage was overlaid by the second load of ABEND. A first load overlay is indicated in TCBFLGS field.
...x	Reserved bit.
.... 1...	A double ABEND has occurred.
.... .1..	A dump message (WTO) is to be issued to the operator.
.... ..1.	Scheduler is to print an indicative dump.
....1	An ABEND message is provided that may be printed by ABDUMP.
Bytes 2-4	System completion code in first 12 bits; user completion code in last 12 bits, or return code if normal return from exit.

2. TCBTRN — A byte used for flags as described.

.... xxxx	Reserved bits.
1...	Both TESTRAN and decimal simulator programs being used on a Mod 91 machine.
.1..	Suppresses taking checkpoints for this step.
..1.	Job step TCB. This is a graphics foreground job or the graphic job processor.
...1	This is a 7094 emulator task on a Mod 85.

Notes:

3. TCBFLGS — Flag byte fields.

Byte 1

1...	Abnormal termination in progress.
.1..	Normal termination in progress.
..1.	ABEND was initiated by the resident abnormal termination routine.
...1	Recursion through ABEND is permitted.
.... 1...	Graphics abnormal termination routine has been entered for this task.
.... .1..	CLOSE initiated by ABEND.
.... ..1.	Problem program storage has been overlaid to process ABEND.
....1	Prohibit queuing of asynchronous exits for this task.

Byte 2

1...	System task: ABEND prohibited for this task.
.x1. ..x.	Trace has been stopped.
...1	Task has issued a 'system-must-complete' and set all other tasks in the system nondispatchable.
.... 1...	Task has issued a 'step-must-complete' and turned off all other tasks in the step.
....1	This task is a member of a time-sliced group.

Byte 3

xx.x ...x	Reserved bits.
..1.	Exit effector: System error routines already operating for this task.
.... 1...	Floating-point registers exist.
.... .1..	Job scheduler routines in process.
.... ..1.	XCTL routine is changing the storage protection key in the PSW from zero to the one used by the problem program.

Byte 4 — Reserved.

Byte 5 — (If any bit in this byte is 1, the task is nondispatchable.)

....1	Primary nondispatchability bit. This bit is set to 1 if any of the secondary nondispatchability bits (offset 173 through 175) is set to 1. This bit is set to 0 if a secondary nondispatchability bit is set to 0 and all other secondary nondispatchability bits are 0.
xxxx xxx.	Reserved bits.

Notes:

4. TCBPIB — A field used for two items of information (partition type).

Byte 1

00..	System task partition.
01..	Reader partition.
10..	Writer partition.
11..	Processing program partition.
..1.	Large partition.
..0.	Small partition.
...1	CPU timing stopped by FINCH until transient is loaded.
.... ..1.	Writer partition, used by ABEND. Required by transient writer, but also used by resident writer.
....1	Scheduler in control. Bit turned off when TIOT written on SYSJOBQE. Used by ABEND.
.... xx..	Reserved bits.

Bytes 2-4 — Address of the partition information block (PIB).

5. TCBFTFLG — Without subtasking: Reserved. With subtasking: Flag bytes.

Byte 1

.... .1..	Top task in tree of abnormally terminating tasks.
.... ..1.	Abnormal termination dump has been completed.
....1	Task is enqueued on dump data set.
xxxx x...	Reserved bits.

6. TCBDAR — Damage assessment routine (DAR) flags.

1...	Primary DAR recursion - DAR failure while writing core image dump.
.1..	Secondary DAR recursion - DAR failure while attempting to reinstate failing partition.
..1.	Only a dump has been requested.
...1	A recursion is permitted in CLOSE after DAR processing is completed.
.... 1...	Problem program storage has been overlaid to process DAR.
.... .xxx	Reserved bits.

Notes:

7. TCBNDSP — Secondary nondispatchability bits.

TCBNDSP1 — If any bit in these bytes is 1, the primary nondispatchability bit (offset 33.7) is 1, and the task is nondispatchable.

xx..	Damage assessment routine bits.
1...	The task is temporarily nondispatchable.
.1..	The task is permanently nondispatchable.
..xx	Recovery management support and system error recovery bits.
..1.	The task is temporarily nondispatchable.
..11	The task is permanently nondispatchable.
.... xxxx	Reserved bits.

TCBNDSP2 — ABDUMP is processing.

1...	(MFT with subtasking)
....1	The dump data set is being opened.
.xxx xxx.	Reserved bits.

TCBNDSP3

1...	Task has been terminated (MFT with subtasking).
.1..	Task to be terminated by ABEND (MFT with subtasking).
..xx xxxx	Reserved bits.

8. Bytes 128 (80) to 159 (9F) are overlayed by other control blocks to save main storage.

DQE (DESCRIPTOR QUEUE ELEMENT)

0 (0) Reserved	1 (1) FQEPTR Pointer to First Free Area
4 (4) Reserved	5 (5) DQEPTR Pointer to Next DQE
8 (8) DQEHRID (see note)	9 (9) Block Address (Address of First 2k Block)
12 (C) Reserved	13 (D) Length (Multiple of 2k Bytes)

Note:

DQEHRID

0000 0000	DQE describes core obtained from hierarchy 0.
0000 0001	DQE describes core obtained from hierarchy 1.

FQE (FREE QUEUE ELEMENT)

0 (0) Reserved	1 (1) FQEPTR Pointer to Next Lower Free Area
4 (4) Reserved	5 (5) Length Number of Bytes in Free Area

AQE (ALLOCATED QUEUE ELEMENT)

0 (0) Reserved	1 (1) AQEPTR Pointer to Next Allocated Area
4 (4) Reserved	5 (5) Length Number of Bytes in Allocated Area

GOVRFLB (ORIGIN LIST FOR MAIN STORAGE QUEUES)

0 (0) Reserved	SQBOUND Address of First Byte Beyond System Queue Area
4 (4) Reserved	DQESQES Address of the DQE Describing the System Queue Area
8 (8) Reserved	PQEPTR Address of a dummy PQE minus 8 bytes. The dummy PQE points to the PQE describing unassigned main storage (storage not assigned to any region).
12 (C) Reserved	SZDPRS Amount of Storage Available in Hierarchy 0 After NIP
16 (10) Reserved	SZDLCS Amount of Storage Available in Hierarchy 1 After NIP
20 (14) COUNT (see note 1)	VQEPTR (M65MP only) Address of the First VQE Describing Storage Areas Scheduled for Removal in a Multiprocessing System (Zero if no VQE's Exist)

Note:

1. The number of 'Vary Storage, Off-line' commands in master scheduler region.

PQE (PARTITIONED QUEUE ELEMENT)

0 (0) PQEFFBQE Address of First FBQE in the Region			
4 (4) PQEBFBQE Address of Last FBQE in the Region			
8 (8) PQEFPQE Address of Next PQE			
12 (C) PQEBPQE Address of Preceding PQE			
16 (10) PQETCB Address of TCB for the Job Step			
20 (14) PQESIZE Size of Region in 2k Multiples			
24 (18) PQEREGN Address of First Byte of This Region			
28 (1C) PQERFLGS (see note 2)	29 (1D) PQEHRID (see note 3)	30 (1E) Reserved	31 (1F) Reserved

2. PQERFLGS — Rollout flags.

0...	Space described by this PQE is owned.
1...	Space described by this PQE is borrowed.
01..	Region has been rolled out.
0.1.	Region has been borrowed.
...1	Region cannot be rolled in because of machine check.
.... xxxx	Reserved bits.

3. PQEHRID — Description of hierarchy identifier.

0000 0000	PQE describes a region in hierarchy 0.
0000 0001	PQE describes a region in hierarchy 1.

DPQE (DUMMY PARITITION QUEUE ELEMENT)

0 (0) Reserved	1 (1)	FWDPTR Pointer to Next Higher FBQE
4 (4) Reserved	5 (5)	BCKPTR Pointer to Next Lower FBQE
8 (8) Reserved	9 (9)	SIZE Number of Bytes in 2k Blocks

SPQE (SUBPOOL QUEUE ELEMENT)

0 (0) Flags (see note 1)	1 (1) SPQEPTR Pointer to the Next SPQE
4 (4) SPID (see note 2)	5 (5) DQEPTR Pointer to the First DQE

Notes:

1.
1...	Subpool is shared.
0...	Subpool belongs to associated task.
.1..	Last SPQE on the queue.
..1.	Subpool is shared with another task.
...x xxxx	Reserved bits.

2.

Subpool No.	Signifies Request for:	Storage Key Assignment	Comments
246	Region	0 storage protection key (when storage-assigned protect key of subpool is assigned)	Signifies request to free existing region and assign new region.
247	Region	0 storage protection key (when storage-assigned protect key of subpool is assigned)	Signifies request to assign new region or free existing region.
248	Region	0 storage protection key (when storage-assigned protect key of subpool is assigned)	Signifies request from rollout/rollin routine to assign a region.
0-127	Space within region	Job step storage protection key (reset to 0 when space is freed)	When subpool 0 is requested by programs executing in supervisor state, subpool 252 is assigned.
250	Space within region	Job step storage protection key (reset to 0 when space is freed)	When requested by programs executing in supervisor state, subpool 0 is assigned.
251	Space within region	Job step storage protection key (reset to 0 when space is freed)	
252	Space within region	0 storage protection key	
253	Space within system queue area	0 storage protection key	Assigned space will be freed when task terminates.
254	Space within system queue area	0 storage protection key	Assigned space will be freed when job step terminates.
255	Space within system queue area	0 storage protection key	Assigned space must be explicitly freed.

REQUEST ELEMENT TABLE -- 16 STAR

LINK FIELD (2 bytes)
This is a 2-byte link field used to link the request elements that are members of a particular queue or belong to the freelist.

UCB ADDRESS (2 bytes)
This field addresses the UCB associated with the queued I/O request.

IOB ADDRESS (3 bytes)
This field contains the address of the IOB associated with the I/O request.

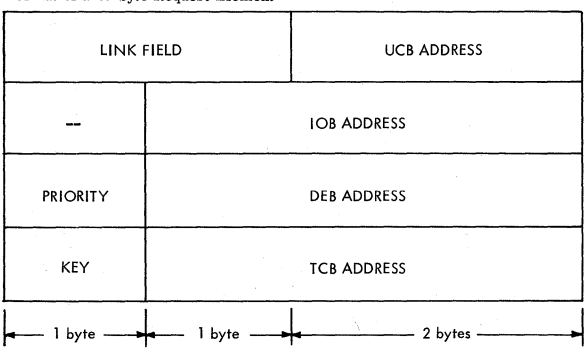
PRIORITY (1 byte)
This byte contains the priority of the I/O request represented by this request element. The priority is assigned at open time according to the priority of the associated task.

DEB ADDRESS (3 bytes)
This field contains the address of the DEB associated with the data set for this I/O request.

KEY (1 byte)
This field contains the protect key associated with the request.

TCB ADDRESS (3 bytes)
This field contains the address of the task control block for the task that initiated the I/O request.

Format of a 16-byte Request Element



CONTENTS DIRECTORY ENTRY
(Pointed to by TCB)

0 (0) CDATTR Attribute Field (See note 1)	1 (1) CDCHAIN Address of Next CDE on Queue
4 (4) CDROLL Reserved	5 (5) CDRBP Request Block Address
8 (8) CDNAME Module Name	
16 (10) CDUSE Use/Responsibility Count	17 (11) CDENTPT Entry Point Address
20 (14) CDATTR2 Attribute Field (See note 2)	21 (15) CDXLMJP Extent List Address or Major CDE Address 23 (17)

Notes:

1. CDATTR — Attribute field.

1...	Module is resident in the link pack area.
.1..	Module is being fetched.
..1.	Module is reenterable.
...1	Module is serially reusable.
.... 1...	Module may not be reused.
.... .1..	This is a minor CDE.
.... ..1.	Module is in the job pack area.
....1	Module is not only loadable.

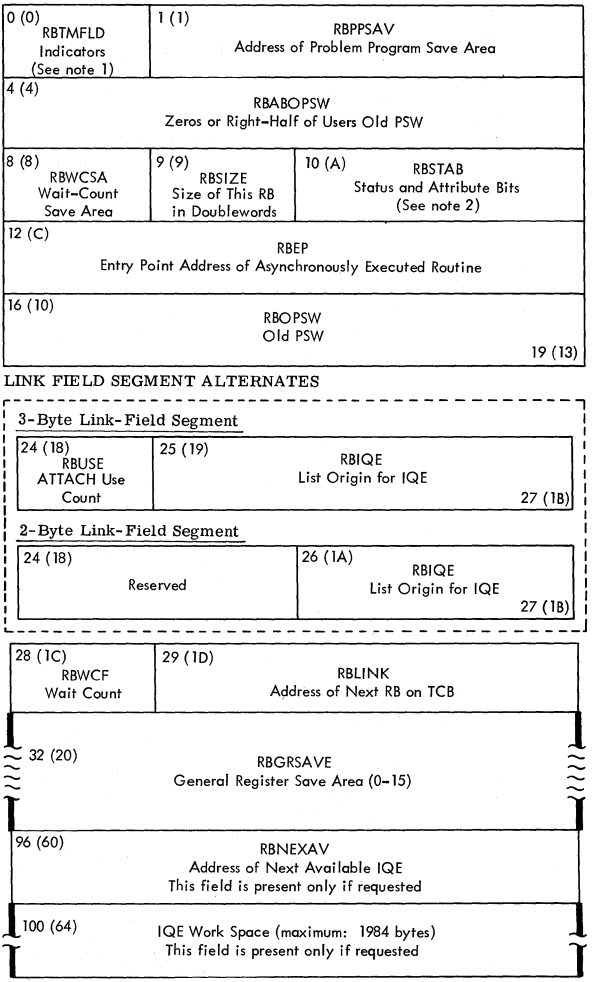
2. CDATTR2 — A second attribute field.

.1..	Module is inactive and may be released.
..1.	An extent list has been built for the module.
...1	This CDE contains a relocated alias entry point address.
.... 1...	The module is refreshable.
x... .xxx	Reserved bits.

LOAD LIST ELEMENT (LLE)

0	0	Zero	Addr of First Byte of Next Element on Load List
4	4	Responsibility Count No. of Req for Mod Via Load Macroinst	Address of CDE for the Module

INTERRUPTION REQUEST BLOCK -- MVT



Notes:

1. RBTMFLD — Indicators for the timer routines. When there are no timer routines, this field is zero.

1...	Timer element not on queue.
.1..	Local time-of-day option is used.
..00	Time interval requested in timer units.
..01	Time interval requested in binary form.
..11	Time interval requested in decimal form.
.... 1...	Interval has expired.
.... .000	Task request.
.... .100	Task request with exit specified.
.... .001	Wait request.
.... .011	Real request.
.... .111	Real request with exit specified.

2. RBSTAB — Status and attribute bits.

Byte 1

00..	Program request block (PRB).
01..	Interrupt request block (IRB).
10..	System interrupt request block (SIRB).
11..	Supervisor request block (SVRB).
..x. xxxx	Reserved bits.
...1	SVRB for transient SVC.

Byte 2

1...	RBLINK field points to TCB.
.1..	Program is active; applies to IRB or SIRB.
...1	The IRB is for an ETXR exit routine.
..x.	Reserved bit.
.... 00..	Request queue element is not to be returned.
.... 01..	IRB has queue elements for asynchronously executed routines that are RQE's.
.... 10..	IQE is not to be returned at EXIT.
.... 11..	IRB has queue elements for asynchronously executed routines that are IQE's.
.... ..1.	Request block storage can be freed at exit.
....0	Wait for a single event or a number of events.
....1	Wait for a number of events that is less than the total number of events waiting.

PROGRAM REQUEST BLOCK -- MVT

0 (0) Reserved		
4 (4) RBABOPSW Zero or Right-Half of User's Old PSW		
8 (8) RBWCSA Wait-Count Save Area	9 (9) RBSIZE Size of This RB in Doublewords	10 (A) RBSTAB Status and Attribute Bits (See note 1)
12 (C) RBCDFLGS Contents Control Flags (See note 2)	13 (D) RBCDE Address of Contents Directory Entry for This Module	
16 (10) RBOPSW Old PSW		
24 (18) Always Zero	25 (19) RBPGMQ Address of RB for Same Serially Reusable Programs	
28 (1C) RBWCF Wait Count	29 (1D) RBLINK Address of Next RB or TCB	31 (1F)

Notes:

1. RBSTAB — Status and attribute bits.

   Byte 1

00..	Program request block (PRB).
01..	Interruption request block (IRB).
10..	System interruption request block (SIRB).
11..	Supervisor request block (SVRB).
..x. xxxx	Reserved bits.
...1	SVRB for transient type 3 or 4 SVC routines.

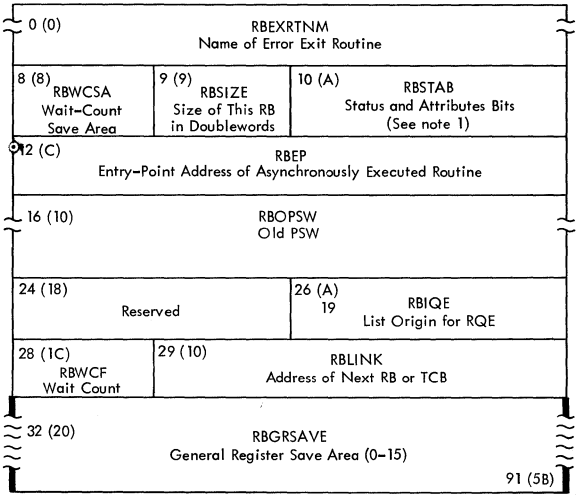
   Byte 2

1...	RBLINK field points to TCB.
.1..	Program is active (applies to IRB or SIRB).
..xx	Reserved bits.
.... 00..	Request queue element is not to be returned to freelist when exit is taken.
.... 01..	IRB has queue elements for asynchronously executed routines that are RQE's.
.... 11..	IRB has queue elements for asynchronously executed routines that are IQE's.
.... ..1.	Request block storage can be freed at exit.
....0	Wait for a single event or a number of events.
....1	Wait for a number of events that is less than the total number of events waiting.

2. RBCDFLGS — Control flags.

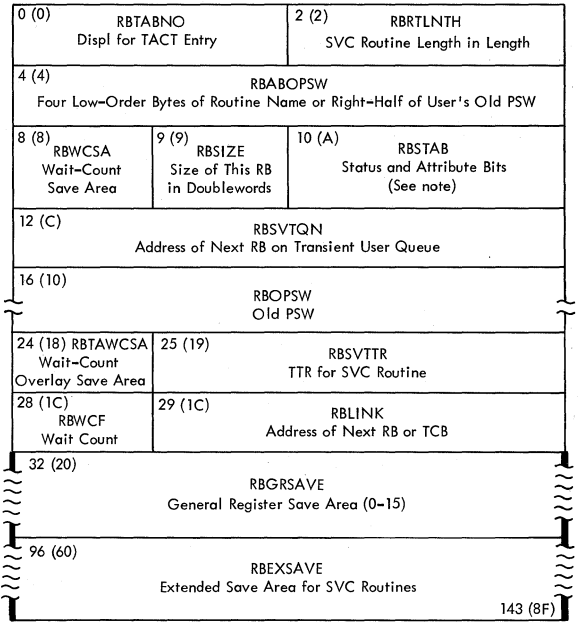
xxxx x...	Reserved bits.
.... .1..	SYNC macroinstruction requested.
.... ..1.	XCTL macroinstruction requested.
....1	LOAD macroinstruction requested.

SYSTEM INTERRUPTION REQUEST BLOCK -- MVT



Comments:

SUPERVISOR REQUEST BLOCK -- MVT --
TRANSIENT SVC ROUTINES



Note:

RBSTAB — Status and attribute bits.

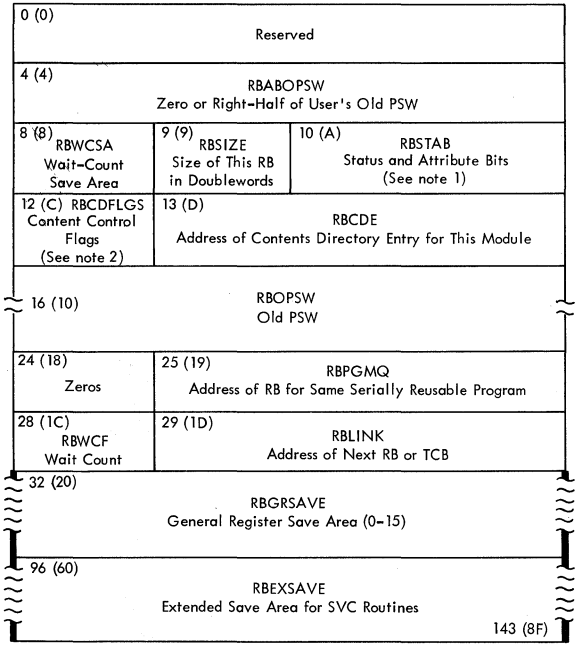
Byte 1

00..	Program request block (PRB).
01..	Interruption request block (IRB).
10..	System interruption request block (SIRB).
11..	Supervisor request block (SVRB).
..x. x.xx	Reserved bits.
...1	SVRB for transient SVC routines.
.... .1..	A checkpoint may be taken in a user exit from this SVC routine.

Byte 2

1...	RBLINK field points to TCB.
.1..	Program is active (applies to IRB or SIRB).
..xx	Reserved bits.
.... 00..	Request queue element is not to be returned.
.... 01..	IRB has queue elements for asynchronously executed routines that are RQE's.
.... 11..	IRB has queue elements for asynchronously executed routines that are IQE's.
.... ..1.	Request block storage can be freed at exit.
....0	Wait for a single event or all of a number of events.
....1	Wait for a number of events that is less than the total number of events waiting.

SUPERVISOR REQUEST BLOCK -- MVT --
RESIDENT SVC ROUTINES



Notes:

1. RBSTAB — Status and attribute bits.

Byte 1

00..	Program request block (PRB).
01..	Interruption request block (IRB).
10..	System interruption request block (SIRB).
11..	Supervisor request block (SVRB).
..x. x.xx	Reserved bits.
.... .1..	A checkpoint may be taken in a user exit from this SVC routine.
...1	SVRB for transient SVC routines.

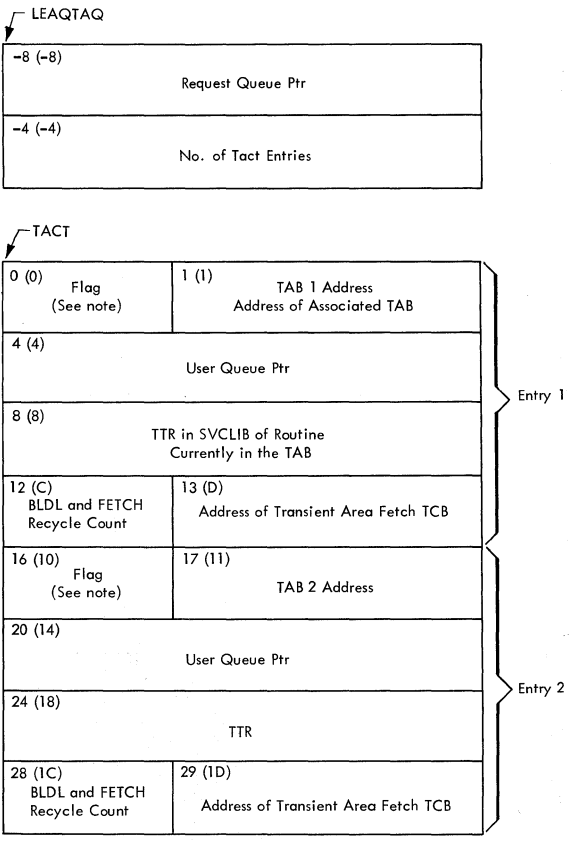
Byte 2

1...	RBLINK field points to TCB.
.1..	Program is active (applies to IRB or SIRB).
..xx	Reserved bits.
.... 00..	Request queue element is not to be returned.
.... 01..	IRB has queue elements for asynchronously executed routines that are RQE's.
.... 10..	IQE is not to be returned at EXIT.
.... 11..	IRB has queue elements for asynchronously executed routines that are IQE's.
.... ..1.	Request block storage can be freed at exit.
....0	Wait for a single event or all of a number of events.
....1	Wait for a number of events that is less than the total number of events waiting.

2. RBCDFLGS — Control flags.

xxxx x...	Reserved bits.
.... .1..	SYNC macroinstruction requested.
.... ..1.	XCTL macroinstruction requested.
....1	LOAD macroinstruction requested.

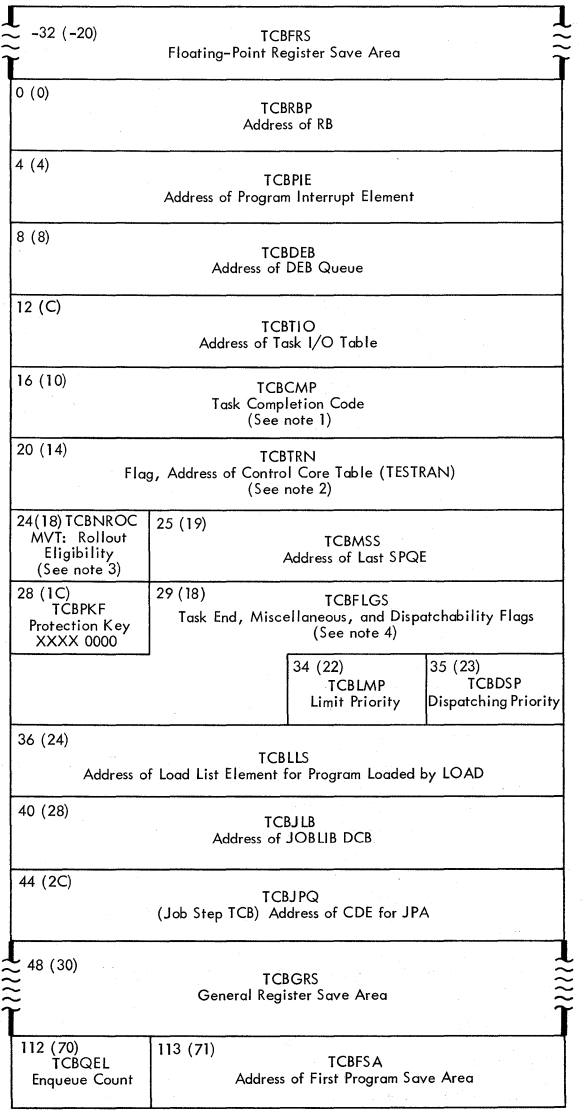
TRANSIENT AREA CONTROL TABLE (TACT)



Note: Each transient area block (TAB) in the system has one four-word entry.

Contents

Flags: X'40' - TAB is being loaded.
X'20' - TAB is free (unoccupied).
X'00' - TAB is being used.


-32 (-20)
TCBFRS
Floating-Point Register Save Area
0 (0)
TCBRBP
Address of RB
4 (4)
TCBPIE
Address of Program Interrupt Element
8 (8)
TCBDEB
Address of DEB Queue
12 (C)
TCBTIO
Address of Task I/O Table
16 (10)
TCBCMP
Task Completion Code
(See note 1)
20 (14)
TCBTRN
Flag, Address of Control Core Table (TESTRAN)
(See note 2)
24(18) TCBNROC
MVT: Rollout
Eligibility
(See note 3)
25 (19)
TCBMSS
Address of Last SPQE
28 (1C)
TCBPKF
Protection Key
XXXX 0000
29 (18)
TCBFLGS
Task End, Miscellaneous, and Dispatchability Flags
(See note 4)
34 (22)
TCBLMP
Limit Priority
35 (23)
TCBDSP
Dispatching Priority
36 (24)
TCBLLS
Address of Load List Element for Program Loaded by LOAD
40 (28)
TCBJLB
Address of JOBLIB DCB
44 (2C)
TCBJPQ
(Job Step TCB) Address of CDE for JPA
48 (30)
TCBGRS
General Register Save Area
112 (70)
TCBQEL
Enqueue Count
113 (71)
TCBFSA
Address of First Program Save Area

116 (74)	TCBTCB Address of Next Lower Priority TCB
120 (78)	TCBTME Address of Timer Element
124 (7C)	TCBJSTCB PCP: Reserved Address of 1st TCB for Job Step
128 (80)	TCBNTC Address of Previous TCB on Subtask Queue (Sister)
132 (84)	TCBOTC Address of Originating TCB (Mother)
136 (88)	TCBLTC Address of Last TCB on Subtask Queue (Daughter)
140 (8C)	TCBIQE Address of IQE for ETXR Routine
144 (90)	TCBECB Address of ECB Posted on Task Completion
148 (94)	Reserved
152 (98)	TCBPQE Address of Region Dummy PQE Minus 8
156 (9C)	TCBAQE Address of Allocated Queue Element
160 (A0)	TCBNSTAE STAE Flags Address of Current STAE Control Block (See note 7)

164 (A4) Reserved	165 (A5) TCBTCT Address of the TCT
168 (A8) TCBUSER User Field	
172 (AC) TCBDAR DAR Flags (See note 5)	173 (AD) TCBNDSP Secondary Nondispatchability Bits (See note 6)
176 (B0) Reserved	
180 (B4) Reserved	181 (B5) TCBJSCB Address of the JSCB

Notes:

1. Byte 1 — A flag byte field containing indicators used or set by the ABEND SVC.

   `1... ....` A dump has been requested.
   `.1.. ....` A step ABEND has been requested.
   `..xx xxxx` Reserved bits.

   Bytes 2-4 — System completion code in first 12 bits; user completion code in last 12 bits (or return code if normal return from exit).

2. TCBTRN — A byte used for flags as described.

   `1... ....` Both TESTRAN and decimal simulator programs being used on a Mod 91 machine.
   `.1.. ....` Suppresses taking checkpoints for this step.
   `..1. ....` Job step TCB: This is a graphics foreground job or the graphic job processor.
   `...1 ....` This is a 7094 emulator task on a Model 85.
   `.... xxxx` Reserved bits.

3. TCBNROC — Job step TCB: Rollout eligibility.

   `00` This job step may be rolled out.
   `nz` This job step may not be rolled out. (nz - A nonzero digit.)

Notes:

4. TCBFLGS

Byte 1

1...	Abnormal termination in progress.
.1..	Normal termination in progress.
..1.	Enter erase routine in ABEND when when ABEND is in control again.
...1	Enter purge routine in ABEND when ABEND is in control again.
.... 1...	Graphics abnormal termination routine is in control of this task. (Bit 7 of byte 3 must also be on.)
.... .1..	Top task in tree being abnormally terminated.
.... ..1.	Abnormal termination dump has been completed.
....1	Asynchronous exits cannot be scheduled.

Byte 2

1...	Operands of ABEND macroinstruction have been saved in TCBCMP field.
.1..	Initiator TCB: Second job step interval has expired.
..1.	Job step TCB: Job step can cause rollout.
...1	System must complete. Current task can be performed; other tasks in system cannot.
.... 1...	Step must complete. Other tasks in job step cannot be performed.
.... .1..	Job step TCB: SYSABEND already open.
.... ..1.	ETXR exit requested by attaching task.
....1	Task is a member of a time-sliced group.

Byte 3

1...	All PSW's for this task in supervisor state.
.1..	Job step TCB: Job step has invoked rollouts that are still in effect.
..1.	Prevent multiple ABEND.
...1 ...x	OPEN issued for SYSABEND. (See bit 7.)
.... 1..x	ABDUMP in process for this task (see bit 7).
.... .1..	Job step TCB: No abnormal termination dumps can be provided within this job step.
.... ..1x	CLOSE has been issued during ABEND processing (see bit 7).
...x x.x1	Valid reentry to ABEND indicated if bits 3, 4, or 6 of this byte or bit 4 of byte 29 is also on.

Notes:

	Byte 4	If any bit in this byte is 1, the task is nondispatchable.
	1...	Set by ABDUMP.
	.1..	Set by SER1.
	..1.	Supply of I/O request queue elements exhausted.
	...x xx..	Reserved bits.
	.... ..1.	M65 multiprocessing: Task has been set nondispatchable by one CPU to prevent any CPU from working on it.
	1	ABEND routine was entered by this task while DCB for SYSBEND was being opened for another task.
	Byte 5	If any bit in this byte is 1, the task is nondispatchable.
	1...	Terminated.
	.1..	To be terminated by ABEND.
	..1.	A routine of this task has issued an unconditional GETMAIN which must be satisfied by rollout of another job step.
	...1	The job step has been rolled out.
	.... 1...	Another task is in system-must-complete status.
	.... .1..	Another task in this job step is in step-must-complete status.
	.... ..1.	Initiator task: Request for a region could not be satisfied.
	1	Primary nondispatchability bit. This bit is set to 1 if any of the secondary nondispatchability bits (offset 173 through 175) is set to 1. This bit is set to 0 if a secondary nondispatchability bit is set to 0 and all other secondary nondispatchability bits are 0.
5.	TCBDAR	Damage assessment routine (DAR) flags.
	1...	Primary DAR recursion - DAR failure while writing core image dump.
	.1..	Secondary DAR recursion - DAR failure while attempting to reinstate failing region/partition.
	..1.	Only a dump has been requested.
	...1	A recursion is permitted in CLOSE after DAR processing is completed.
	.... 1...	Problem program storage has been overlaid to process DAR.
	xxx	Reserved bits.

Notes:

6. TCBNDSP — Secondary nondispatchability bits.

TCBNDSP1 — If any bit in these bytes is 1, the primary nondispatchability bit (offset 33.7) is 1, and the task is nondispatchable.

xx..	Damage assessment routine bits.
1...	The task is temporarily nondispatchable.
.1..	The task is permanently nondispatchable.
..xx	Recovery management support and system error recovery bits.
..1.	The task is temporarily nondispatchable.
..11	The task is permanently nondispatchable.
.... 1...	DAR has set the task temporarily nondispatchable.
.... .xxx	Reserved bits.

TCBNDSP2 — Reserved.

TCBNDSP3 — Reserved.

7. STAE — Flags

1...	ABEND entered because of an error during STAE processing.
.1..	STAE routine invoked purge I/O with the quiesce I/O option.
..1.	The current SCB has the XCTL=YES option.
...1	SCB created by a program that is scatter-loaded.
.... 1...	Purge I/O did not successfully quiesce I/O, but I/O was halted.
.... .1..	Program using STAE is in supervisor mode.
.... ..1.	STAE user requested that a retry be scheduled but that RB chain not be purged.
....1	Retry routine and parm list addresses are valid.

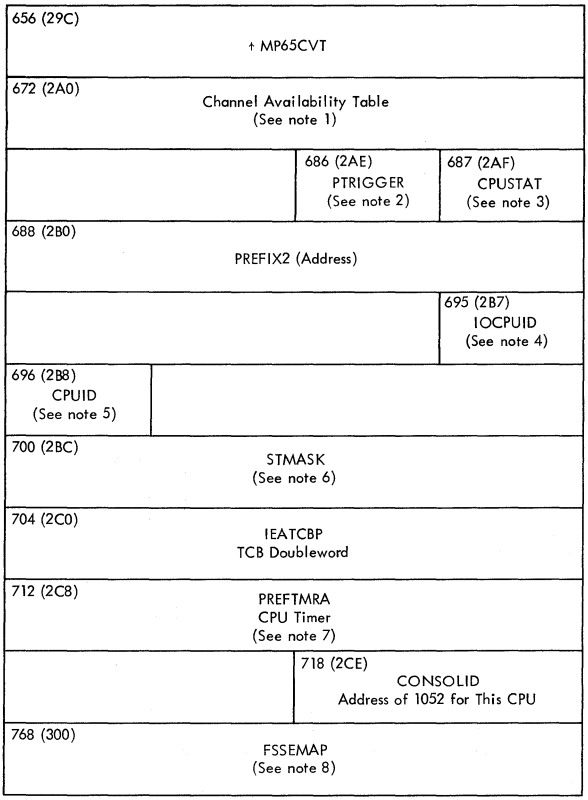
VARY QUEUE ELEMENT (VQE)

The VQE describes the main storage area to be logically removed from a Model 65 multiprocessing system due to a vary storage off-line command. The address of the vary queue is located in the GOVRFLB table.

0 (0) 0	1 (1) Address of Next VQE on Vary Queue
4 (4) 0	5 (5) Lower Address of Area Specified in Vary Command
8 (8) 0	9 (9) Length of Area Specified in Vary Command
12 (C) 0	13 (D) ECB - Posted by FREEPART

Comments:

MP65 PSA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† MP65CVT
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(See note 2)
687 (2AF)
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(See note 4)
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(See note 6)
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IEATCBP
TCB Doubleword
712 (2C8)
PREFTMRA
CPU Timer
(See note 7)
718 (2CE)
CONSOLID
Address of 1052 for This CPU
768 (300)
FSSEMAP
(See note 8)

Notes:

1.

Channel	Byte 0	Byte 1
6	0001 0110	0000 0000
5	0001 0101	0000 0000
4	0001 0100	0000 0000
3	0001 0011	0000 0000
2	0001 0010	0000 0000
1	0001 0001	0000 0000
0	0001 0000	0000 0000

Byte 0 indicates channel status and number; byte 1 indicates control unit/device address. The channel availability table contains an entry for each channel.

Byte 0	Setting	Meaning
Bit 0	0	Channel not busy.
	1	Channel is busy.
Bit 1	0	Channel is operational.
	1	Channel is not operational.
Bit 2	0	Channel is attached to system.
	1	Channel is not attached to system.
Bit 3	0	Channel is initialized.
	1	Channel is not initialized.

2. PTRIGGER

Hex '40'	If prefix trigger log bit, bit 2 of byte X '88' is 0; prefix switch is disabled.
Hex 'D7'	If prefix trigger log bit is 1, prefix switch is enabled.

3. CPUSTAT — Status of CPU.

0000 0000	Multisystem with two CPU's.
0000 0001	Partitioned.
0000 0010	Multisystem with one CPU.

4. IOCPUID — CPU that started last I/O operation.

x'00 00 00 00'	CPU A.
x'00 00 00 08'	CPU B.

5. CPUID — ID of CPU to which this PSA belongs.

X'C1'	CPU A.
X'C2'	CPU B.

Notes:

6. STMASK — Shoulder tap mask.

Byte 1

1...	Pending. Previous external interrupt not completed processing (request for task switch if only bit on).
.1..	Enter dispatcher.
..1.	Ring bell and wait.
...1	Channel check being processed by MCH.
....1	Request for HIO.
.... xxx.	Reserved bits.

Byte 2

xxxx xxxx	Reserved bits.

Byte 3

1...	Quiesce command.
.1..	Vary CPU command.
..xx xxxx	Reserved bits.

Byte 4

1...	Start I/O on channel 0.
.1..	Start I/O on channel 1.
..1.	Start I/O on channel 2.
...1	Start I/O on channel 3.
.... 1...	Start I/O on channel 4.
.... .1..	Start I/O on channel 5.
.... ..1.	Start I/O on channel 6.
....x	Reserved bit.

7. PREFTMRA — Timer prefix field.

Zeros	Timer active.
Pointer to Prefix 2	Timer inactive.

8. FSSEMAP — Fail soft storage element map.

The FSSEMAP is a 128-byte (1024 bits) field at hex location 300 in a multiprocessing system. Each 2k block of main storage is described by two bits that can have the following values:

Setting	Indication
00	Normal (described by an FBQE or PQE).
10	Reserved.
01	Reserved.
11	Logically removed from the system (not described by an FBQE or PQE).

Given a main storage address (X), the corresponding 2k block (b) is:

$$b = \frac{X}{2048}$$ (Disregard remainder).

The number (n) of the first of the two bits that describe the 2k block is: n = 2*b.

APPENDIX I. SYSTEMS REFERENCE LIBRARY (OS PUBLICATIONS)

Title	Order Number
OS VTOC Overlay for LISTVTOC Function	SM08-0033
S/360 Operator's Reference Guide	SR20-1078
S/360 Catalog of Programs	GC20-1619
OS PSM's	G220-2004
S/360 Models 25,30,40,50,65,75,85	G520-2114
FE Microfiche Handbook	S229-0014
OS FE Handbook	S229-3169
OS Exercise Deck	SV25-6463
OS Introduction	GC28-6534 GCB8-6534 (fiche)
OS Concepts and Facilities	GC28-6535 GCB8-6535 (fiche)
OS Job Control Language	GC28-6539 GCB8-6539 (fiche)
OS Operator's Guide	GC28-6540 GCB8-6540 (fiche)
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OS System Generation	GC28-6554 GCB8-6554 (fiche)
OS System Control Blocks	GC28-6628 GCB8-6628 (fiche)
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OS Tape Labels	GC28-6680
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OS System Management Facilities Planning	GC28-6712
OS Release 18 Guide	GC28-6718
S/360 System Summary	GA22-6810
S/360 Principles of Operation	GA22-6821
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OS Introduction to Main Storage Hierarchy Support for 2361 Core Storage	GC27-6942 GCB7-6942 (fiche)
OS 7094 Emulator for Model 85	GC27-6944 GCB7-6944 (fiche)

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OS Assembler E Programmer's Guide	GC28-6595 GCB8-6595 (fiche)
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OS TESTRAN	GC28-6648 GCB8-6648 (fiche)
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OS COBOL to PL/I LCP	GC33-2001
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OS COBOL ANS Version 3	GC28-6406
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OS Messages and Codes	GC28-6631 GCB8-6631 (fiche)
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