

DIRECT INDEX

Op, J, A(I)

35 35 37 39 41 43 45 47 49 51 53 55 57 59 61 63
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30

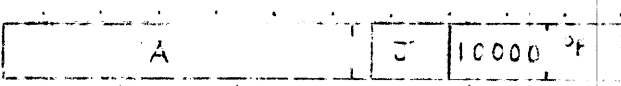


00000001	LX	LOAD INDEX
00000011	LV	LOAD VALUE
00000101	LC	LOAD COUNT
00000111	LR	LOAD REFILL
00001001	KV	COMPARE VALUE
00001011	V+	ADD TO VALUE
00001101	V+	ADD TO VAL & CNT
00001111	V+R	ADD TO VAL, CNT & REF
10000001	SV	STORE INDEX
10000011	SV	STORE VALUE
10000101	SC	STORE COUNT
10000111	SR	STORE REFILL
10001001	KC	COMPARE COUNT
10001011	LVE	LOAD VAL EFFECTIVE
10001101	SVA	STORE VAL IN ADDR.
10001111	RNR	RENAME

IMMEDIATE INDEX

Op, J, A

35 35 37 39 41 43 45 47 49 51 53 55 57 59 61 63
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30

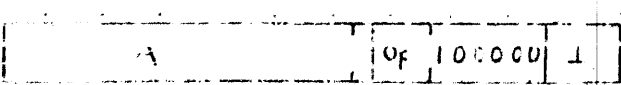


1000000001	C+I	ADD IMM. TO CNT.
1000000011	LVI	LOAD VAL IMM.
1000000101	LVI	LOAD CNT IMM.
1000000111	LRI	LOAD REF IMM.
1000001001	KVI	COMP VAL IMM.
1000001011	V+I	ADD IMM. TO VAL
1000001101	V+I	" " " CNT.
1000001111	V+ICR	" " " CNT & REF.
1000010001	C-I	SUBT IMM. FR CNT.
1000010011	LVI	LOAD VAL NEG IMM.
1000010101	KVI	COMP CNT IMM.
1000010111	LVS	LOAD VAL IN SUM
1000011001	KVI	COMP VAL NEG IMM.
1000011011	V-I	SUBT IMM. FR VAL
1000011101	V+IC	" " " CNT
1000011111	V+ICR	" " " CNT & REF.

MISCELLANEOUS OPERATIONS

Op, A(I)

33 35 37 39 41 43 45 47 49 51 53 55 57 59 61 63
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30



- A
0 INITIATE STREAM
1 RESUME STREAM

0000000001	R	REFILL
0000000011	RZ	REFILL ON COUNT ZERO
0000000101	EX	EXECUTE
0000000111	EXIC	EXECUTE INDIRECT CNT
0000001001	Z	STORE ZERO
0000001011	(SDS)	BRN DIS. STREAM
0000001101		CLEAR SMALL BLOCK MEM.
0000001111		CLEAR LARGE BLOCK MEM.

FLOATING POINT

Op (dd), A (I)

33 35 37 39 41 43 45 47 49 51 53 55 57 59 61 63
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30

N - normalized
U - unnormalized



19 20

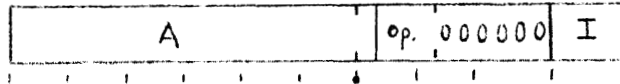
- | | | | |
|-----|---------------|---|---|
| 0 x | SAME SIGN | } | S |
| 1 x | ABSOLUTE SIGN | | |
| x 0 | SAME SIGN | | |
| x 1 | NEGATIVE SIGN | | |

0 0 0 0 0 1 0 1 0 1		+	ADD
0 0 0 0 1 1 1 0 1		L	LOAD
0 0 0 1 0 1 1 1 0		M+	ADD TO MEM
0 0 0 1 1 1 1 1 0		ST	STORE
0 0 1 0 0 1 1 1 0		K	COMPARE
0 0 1 0 1 1 1 1 0		KR	COMP FOR RANGE
0 0 1 1 0 1 1 1 0		M	MULTIPLY
0 0 1 1 1 1 1 1 0		Z	DIVIDE
0 1 0 0 0 1 1 1 0		+MAG	ADD TO MAGNITUDE
0 1 0 0 1 1 1 1 0		LWF	LOAD WI FLAG
0 1 0 1 0 1 1 1 0		M+MAG	ADD MAGN. TO MEM
0 1 0 1 1 1 1 1 0		SRD	STORE ROUNDED
0 1 1 0 0 1 1 1 0		KMG	COMP. MAGNITUDE
0 1 1 0 1 1 1 1 0		KMGK	COMP. MAGN. FOR RANGE
0 1 1 1 0 1 1 1 0		M*	MULTIPLY & ADD
0 1 1 1 1 1 1 1 0		RT	RECIPROCAL DIVIDE
1 0 0 0 0 1 1 1 0		D+	ADD DOUBLE
1 0 0 0 1 1 1 1 0		DL	LOAD DOUBLE
1 0 0 1 0 1 1 1 0		LFT	LOAD FACTOR
1 0 0 1 1 1 1 1 0		SLD	STORE LOW ORDER
1 0 1 0 0 1 1 1 0		F+	ADD TO FRACTION
1 0 1 0 1 1 1 1 0		E+	ADD TO EXPONENT
1 0 1 1 0 1 1 1 0		D*	MULTIPLY DOUBLE
1 0 1 1 1 1 1 1 0		D/	DIVIDE DOUBLE
1 1 0 0 0 1 1 1 0		D+MAG	ADD DOUBLE TO MAGN.
1 1 0 0 1 1 1 1 0		D+LWF	LOAD DOUBLE WI FLAG
1 1 0 1 0 1 1 1 0		SRT	STORE ROOT
1 1 0 1 1 1 1 1 0		SHE	SHIFT FRACTION
1 1 1 0 0 1 1 1 0		E+I	ADD IMMED TO EXPONENT
1 1 1 0 1 1 1 1 0			

UNCONDITIONAL BRANCHING

Op, A (I)

33 35 37 39 41 43 45 47 49 51 53 55 57 59 61 63
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30



0 0 0 0 0 0 0 0 0 0		BE	BRANCH ENABLED
0 0 1 0 0 0 0 0 0 0		BD	BRANCH DISABLED
0 1 0 0 0 0 0 0 0 0		B	BRANCH
0 1 1 0 0 0 0 0 0 0		BR	BRANCH RELATIVE
1 0 0 0 0 0 0 0 0 0		BEW	BRANCH ENABLED & WAIT
0 1 0 1 0 0 0 0 0 0			BRANCH ENABLE INITIATE STRM
1 1 0 1 0 0 0 0 0 0			" " RESUME "
1 1 0 0 0 0 0 0 0 0		NOP	NO OPERATION
1 1 1 0 0 0 0 0 0 0			
1 1 1 1 0 0 0 0 0 0			
1 1 1 1 1 0 0 0 0 0			
1 1 1 1 1 1 0 0 0 0			

INDICATOR BRANCH

Op, A (K)

33 35 37 39 41 43 45 47 49 51 53 55 57 59 61 63
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30



100000	BR ()	BR ZERO BIT - LEAVE
01	BR ()	BR ONE BIT - LEAVE
10	BR ()	BR ZERO BIT - SET TO ZERO
11	BR ()	BR ONE BIT - SET TO ZERO
000000	MK	MACH CHK INDIC
000001	IK	INSTRUCTION CHK
000100	IJ	INSTRUCTION REJECT
000011	EK	EXCHANGE CONTROL CHK
000100	TS	TIME SIGNAL
000101	CPVS	OTHER CPU
000110	EKT	EXCH CHK REJECT
000111	UNRT	UNIT NOT READY REJECT
001000	CBJ	CHANNEL BUSY REJECT
001001	EPGK	EXCH PROG CHK

etc.

COUNT AND BRANCH

Op, J, A (K)

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30

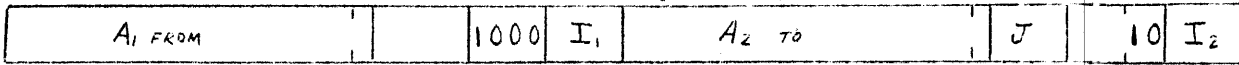


00100100	CB	CNT, BRAN IF NOT '0'
00100101	CB=	CNT, BRAN IF = 0
00111100	CBR	CNT, BRAN ≠ 0, REF = 0
00111101	CBR=	CNT, BRAN IF = 0, REF = 0
01111100	CBH	+ 1/2 ADVANCE
01111101	CBZH	"
01111110	CBRH	"
01111111	CBRH	"
10111100	CB+	+ 1 ADVANCE
10111101	CB+	"
10111110	CB+	"
10111111	CBR+	"
11111100	CB-	DIMINISH
11111101	CB-	"
11111110	CB-	"
11111111	CBR-	"

TRANSMIT

$Op, J, A_1(I_1), A_2(I_2)$

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62



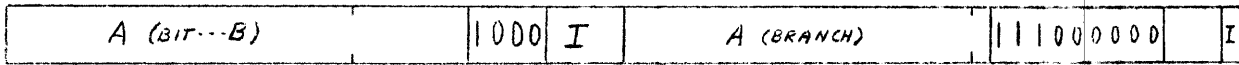
0	0	0	1	0	T	TRANS-DIR-FWD
0	0	1	1	0	SWAP	SWAP - " "
C	C	C	0	1	TJ	TRANS-IMM "
C	C	C	0	1	SWAPJ	SWAP - " "
1	0	0			TB	TRANS-DIR-BKWD
1	0	1			SWAPB	SWAP " "
C	C	C	1	1	TBJ	TRANS-IMM "
C	C	C	1	1	SWAPBJ	SWAP " "

c = immediate count field
 direct uses count field from IXJ

BIT BRANCHING

$Op, B(I), A(K)$

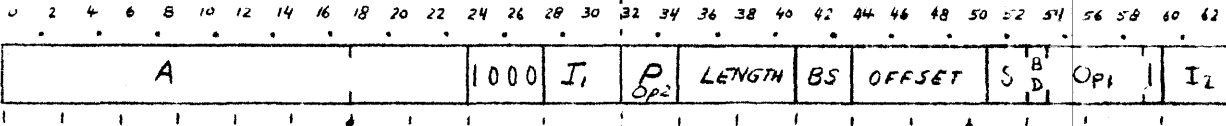
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62



1	0	0	0	BRAN ON ZERO BIT-LEAVE	BZB	1	1	1	0	0	0	0	0	0	0	0	0
1	0	0	0	BRAN ON ONE BIT-LEAVE	BB	1	1	1	0	0	0	0	0	0	0	0	1
				" " ZERO " ~ SET ZERO	BZZ												0
				" " ONE " ~ SET ZERO	BBZ												0
				" " ZERO " ~ INVERT	BZBN												1
				" " ONE " ~ INVERT	BBN												1
				" " ZERO " ~ SET ONE	BZB1												1
				" " ONE " ~ SET ONE	BB1												1

INTEGER ARITHMETIC VFL

$Op_1 (Op_2) (dd), A(I_1), \text{OFFSET} (I_2)$



DIRECT ADDRESSING		0	0	0
ADD TO VALUE	V+I	0	0	1
ADD TO VAL & CNT	V+IC	0	1	0
ADD TO VAL, CNT, REF	V+ICR	0	1	1
IMMEDIATE ADDR	I	1	0	0
SUB FR VAL	V-I	1	0	1
SUB FR VAL & CNT	V-IC	1	1	0
SUB FR VAL, CNT, REF	V-ICR	1	1	1

SIGNED ~ SAME	0	0
SIGNED ~ INVERT	0	1
UNSIGNED ~ PLUS	1	0
UNSIGNED ~ MINUS	1	1

0	0	0	0	0	1	+ ADD
0	0	0	0	1	1	LCV LOAD CONVERTED
0	0	0	1	0	1	L LOAD
0	0	0	1	1	1	CONNECT
0	0	1	0	0	0	M1 ADD TO MEM
0	0	1	0	1	1	LET LOAD FACTOR
0	0	1	1	0	0	ST STORE
0	0	1	1	1	1	CONNECT
0	1	0	0	0	0	K COMPARE
0	1	0	0	1	1	KE COMP IF EQUAL
0	1	0	1	0	0	KR COMP FOR RANGE
0	1	0	1	1	1	CONNECT
0	1	1	0	0	0	* MULTIPLY
0	1	1	0	1	1	CV CONVERT
0	1	1	1	0	0	/ DIVIDE
0	1	1	1	1	1	CONNECT
1	0	0	0	0	0	+MG ADD TO MAGN
1	0	0	0	1	1	LTREV LTRANSLT CVRT
1	0	0	1	0	0	LWF LOAD W/ FLWG
1	0	0	1	1	1	CONNECT
1	0	1	0	0	0	M+MG ADD MAGN & MEM
1	0	1	0	1	1	M+I ADD I TO MEM
1	0	1	1	0	0	SRD STORE ROUNDED
1	0	1	1	1	1	CONNECT
1	1	0	0	0	0	KE COMPARE FIELD
1	1	0	0	1	1	KEE COMP FLD IF =
1	1	0	1	0	0	KER COMP FLD RANGE
1	1	0	1	1	1	CONNECT
1	1	1	0	0	0	*+ MULT & ADD
1	1	1	0	1	1	DCV CONVERT DOUBLE
1	1	1	1	0	0	LTRS LOAD TRANSIT & SET
1	1	1	1	1	1	CONNECT

CONNECTIVE OPERATIONS

$Op_1 (Op_2) (dd), A(I_1), \text{OFFSET} (I_2)$

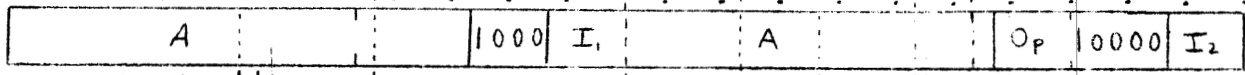
0	0	1	1	1	1	C CONNECT
0	1	1	1	1	1	CM CONNECT TO MEM
1	0	1	1	1	1	CT CONNECT FOR TEST
1	1	1	1	1	1	CONNECT

0	0	0	0	0	0	0
0	0	0	0	0	1	m · a
0	0	0	0	1	0	m · a
0	0	0	1	0	0	m
0	0	0	1	0	1	m · a
0	0	1	0	0	0	a
0	0	1	0	0	1	m + a
0	0	1	0	1	0	m · a
0	0	1	0	1	1	m · a
0	1	0	0	0	0	m · a
0	1	0	0	0	1	m · a
0	1	0	0	1	0	m · a
0	1	0	0	1	1	m · a
0	1	0	1	0	0	m · a
0	1	0	1	0	1	m · a
0	1	0	1	1	0	m · a
0	1	0	1	1	1	m · a
0	1	1	0	0	0	m · a
0	1	1	0	0	1	m · a
0	1	1	0	1	0	m · a
0	1	1	0	1	1	m · a
0	1	1	1	0	0	m · a
0	1	1	1	0	1	m · a
0	1	1	1	1	0	m · a
0	1	1	1	1	1	m · a

INPUT - OUTPUT

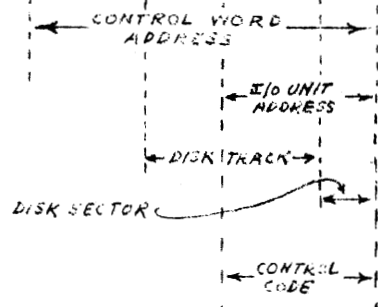
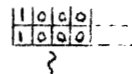
Op1 (Op2), C (I1), A (I2)

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62



CHANNEL ADDRESS

729	01000000
729	01000001
RESERVED	01000100
RESERVED	01000101
READER	01001000
PRINTER	01001001
PUNCH	01001100
CONSOLE	01001101
HIGH EXCH. NO.	00
DISK UNIT ADDR	X X X X X

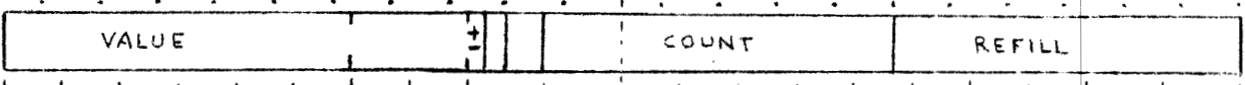


0000	11000000	RD	READ
0001	11000001	W	WRITE
0010	11000010	CTL	CONTROL
0011	11000011	LOC	LOCATE
0100	11000100	RL (SEOP)	READ SEOP
0101	11000101	WL (SEOP)	WRITE "
0110	11000110	CTL (SEOP)	
0111	11000111	LOC (SEOP)	
1000	11001000	CCW	COPY CTL WD
1001	11001001	REL	RELEASE
1010	11001010		~
1011	11001011		~
1100	11001100	REL (SEOP)	
1101	11001101		~
1110	11001110		~
1111	11001111		~

RDR LIGHT OFF	PUNCH RES LIGHT OFF	00001110	729 INDIC OFF	PRNT LIGHT OFF
LIGHT ON	LIGHT ON	00001111	HIGH DENSITY	LIGHT ON
		00011110	LOW DENSITY	
		00011111		
		00101110	ERASE LONG GAP	
ECC MODE	ECC MODE	00101111	ECC MODE	
		00111110	SPACE BLOCK	
		00111111	SPACE FILE	
CHK LIGHT ON	CHK LIGHT ON	01001110	WRITE T.M.	CHK LIGHT ON
		01001111		
		01011110	REWIND	
		01011111	REW & UNLOAD	
		01101110	EVEN PARITY	
NO ECC MODE	NO ECC MODE	01101111	ODD PARITY	
		01111110	BKSP BLOCK	
		01111111	BKSP FILE	

INDEX AND/OR CONTROL WORD

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62



X	INDEX SIGN
X	INDEX FLAG
X	CW CHAIN FLAG
X	CW MULTIPLE FLAG
X	CW SKIP FLAG
00	CW (CR) COUNT WITHIN RECORD
01	CW (CD) COUNT DISREGARD RECORD
10	CW (CR) CHAIN COUNT WITHIN RECORD
11	CW (CDSC) CNT, DISREGARD RECORD, CHAIN
X X 1	S--- SKIP AND ---

EXCHANGE STATUS BITS

UNIT READY	X
EXCH PROG. CHECK	X
UNIT CHECK	X
END EXCEPTION	X
END OF OPERATION	X
CHANNEL SIGNAL	X
SUPPRESS END OF OPN.	X

