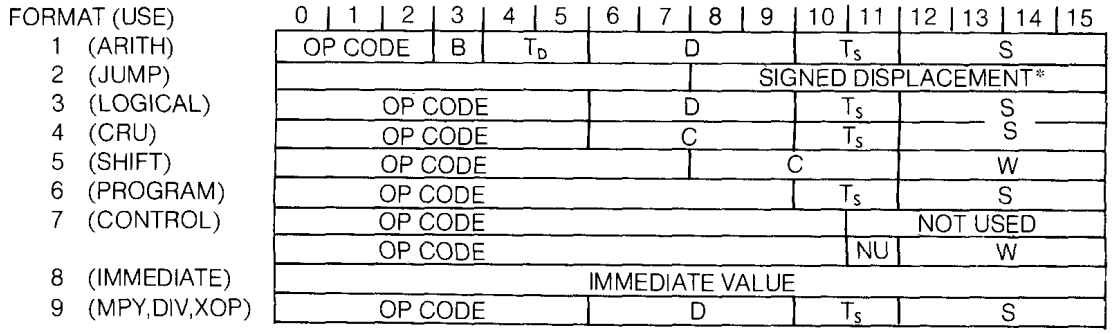
9900
Reference Data

INSTRUCTION FORMAT



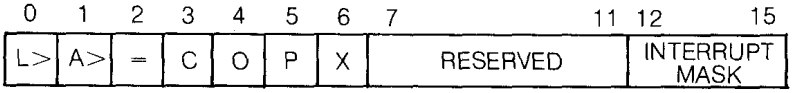
KEY

B = BYTE INDICATOR
(1 = BYTE, 0 = WORD)
T_D = D ADDR, MODIFICATION
D = DESTINATION ADDR.
T_S = ADDR. MODIFICATION
S = SOURCE ADDR.
C = XFR OR SHIFT LENGTH (COUNT)
W = WORKSPACE REGISTER NO.
* = SIGNED DISPLACEMENT OF −128 TO +127 WORDS
NU = NOT USED

T_D/T_S FIELD

	CODE	EFFECTIVE ADDRESS	MNEMONIC
00:	REGISTER	WP + 2 · [S OR D]	Rn
01:	INDIRECT	(WP + 2 · [S OR D])	*Rn
10:	INDEXED (S OR D ≠ 0)	(WP + 2 · [S OR D]) + (PC); PC ← PC + 2	NUM (Rn)
10:	SYMBOLIC (DIRECT, S OR D = 0)	(PC); PC ← PC + 2	NUM
11:	INDIRECT WITH AUTO INCREMENT	(WP + 2 · [S OR D]); INCREMENT EFF. ADDR.	*Rn+

STATUS REGISTER



0 — LOGICAL GREATER THAN
1 — ARITHMETIC GREATER THAN
2 — EQUAL/TB INDICATOR
3 — CARRY FROM MSB
4 — OVERFLOW
5 — PARITY (ODD NO. OF BITS SET)
6 — XOP IN PROGRESS

INTERRUPT MASK
F = ALL INTERRUPTS ENABLED
0 = ONLY LEVEL 0 ENABLED

INTERRUPTS

TRAP ADDR	WP
TRAP ADDR + 2	PC

LEVEL	ID	TRAP ADDR	LEVEL	ID	TRAP ADDR
0	RESET	0000	8	EXTERNAL	0020
1	EXTERNAL	0004	9	EXTERNAL	0024
2	EXTERNAL	0008	10	EXTERNAL	0028
3	EXTERNAL	000C	11	EXTERNAL	002C
4	EXTERNAL	0010	12	EXTERNAL	0030
5	EXTERNAL	0014	13	EXTERNAL	0034
6	EXTERNAL	0018	14	EXTERNAL	0038
7	EXTERNAL	001C	15	EXTERNAL	003C

NOTES: 1) XOP VECTORS 0—15 OCCUPY MEMORY LOCATIONS 0040-007C
2) LOAD VECTOR OCCUPIES MEMORY LOCATIONS FFFC–FFFF

BLWP TRANSFERS	RTWP TRANSFERS	BL TRANSFER	XOP TRANSFER
WP → NEW W13	CURRENT W13 → WP	PC → W11	EFF. ADDR. → NEW W11
PC → NEW W14	CURRENT W14 → PC		WP → NEW W13
ST → NEW W15	CURRENT W15 → ST		PC → NEW W14
			ST → NEW W15
			1 → ST6

INSTRUCTIONS BY MNEMONIC

MNEMONIC	OP CODE	FORMAT	RESULT COMPARED TO ZERO	STATUS AFFECTED	INSTRUCTIONS
A	A000	1	Y	0-4	ADD(WORD)
AB	B000	1	Y	0-5	ADD(BYTE)
ABS	0740	6	Y	0-4	ABSOLUTE VALUE
AI	0220	8	Y	0-4	ADD IMMEDIATE
ANDI	0240	8	Y	0-2	AND IMMEDIATE
B	0440	6	N	—	BRANCH
BL	0680	6	N	—	BRANCH AND LINK (W11)
BLWP	0400	6	N	—	BRANCH LOAD WORKSPACE POINTER
C	8000	1	N	0-2	COMPARE (WORD)
CB	9000	1	N	0-2,5	COMPARE (BYTE)
CI	0280	8	N	0-2	COMPARE IMMEDIATE
CKOF	03C0	7	N	—	EXTERNAL CONTROL
CKON	03A0	7	N	—	EXTERNAL CONTROL
CLR	04C0	6	N	—	CLEAR OPERAND
COC	2000	3	N	2	COMPARE ONES CORRESPONDING
CZC	2400	3	N	2	COMPARE ZEROES CORRESPONDING
DEC	0600	6	Y	0-4	DECREMENT (BY ONE)
DECT	0640	6	Y	0-4	DECREMENT (BY TWO)
DIV	3C00	9	N	4	DIVIDE
IDLE	0340	7	N	—	COMPUTER IDLE
INC	0580	6	Y	0-4	INCREMENT (BY ONE)
INCT	05C0	6	Y	0-4	INCREMENT (BY TWO)
INV	0540	6	Y	0-2	INVERT (ONES COMPLEMENT)
JEQ	1300	2	N	—	JUMP EQUAL (ST2 = 1)

INSTRUCTIONS BY MNEMONIC

JGT	1500	2	N	—	JUMP GREATER THAN (ST1 = 1)
JH	1B00	2	N	—	JUMP HIGH (STO = 1 AND ST2 = 0)
JHE	1400	2	N	—	JUMP HIGH OR EQUAL (STO OR ST2 = 1)
JL	1A00	2	N	—	JUMP LOW (STO AND ST2 = 0)
JLE	1200	2	N	—	JUMP LOW OR EQUAL (STO = 0 OR ST2 = 1)
JLT	1100	2	N	—	JUMP LESS THAN (ST1 AND ST2 = 0)
JMP	1000	2	N	—	JUMP UNCONDITIONAL
JNC	1700	2	N	—	JUMP NO CARRY (ST3 = 0)
JNE	1600	2	N	—	JUMP NOT EQUAL (ST2 = 0)
JNO	1900	2	N	—	JUMP NO OVERFLOW (ST4 = 0)
JOC	1800	2	N	—	JUMP ON CARRY (ST3 = 1)
JOP	1C00	2	N	—	JUMP ODD PARITY (ST5 = 1)
LDCR	3000	4	Y	0-2,5	LOAD CRU
LI	0200	8	N	0-2	LOAD IMMEDIATE
LIMI	0300	8	N	12-15	LOAD IMMEDIATE TO INTERRUPT MASK
LREX	03E0	7	N	12-15	EXTERNAL CONTROL
LWPI	02E0	8	N	—	LOAD IMMEDIATE TO WORKSPACE POINTER
MOV	C000	1	Y	0-2	MOVE (WORD)
MOVB	D000	1	Y	0-2,5	MOVE (BYTE)
MPY	3800	9	N	—	MULTIPLY
NEG	0500	6	Y	0-4	NEGATE (TWO'S COMPLEMENT)
ORI	0260	8	Y	0-2	OR IMMEDIATE
RSET	0360	7	N	12-15	EXTERNAL CONTROL
RTWP	0380	7	N	0-6,12-15	RETURN WORKSPACE POINTER
S	6000	1	Y	0-4	SUBTRACT (WORD)
SB	7000	1	Y	0-5	SUBTRACT (BYTE)
SBO	1D00	2	N	—	SET CRU BIT TO ONE
SBZ	1E00	2	N	—	SET CRU BIT TO ZERO
SETO	0700	6	N	—	SET ONES
SLA	0A00	5	Y	0-4	SHIFT LEFT (ZERO FILL)
SOC	E000	1	Y	0-2	SET ONES CORRESPONDING (WORD)
SOCB	F000	1	Y	0-2,5	SET ONES CORRESPONDING (BYTE)
SRA	0800	5	Y	0-3	SHIFT RIGHT (MSB EXTENDED)
SRC	0800	5	Y	0-3	SHIFT RIGHT CIRCULAR
SRL	0900	5	Y	0-3	SHIFT RIGHT (LEADING ZERO FILL)
STCR	3400	4	Y	0-2,5	STORE FROM CRU
STST	02C0	8	N	—	STORE STATUS REGISTER
STWP	02A0	8	N	—	STORE WORKSPACE POINTER
SWPB	06C0	6	N	—	SWAP BYTES
SZC	4000	1	Y	0-2	SET ZEROES CORRESPONDING (WORD)
SZCB	5000	1	Y	0-2,5	SET ZEREOS CORRESPONDING (BYTE)
TB	1F00	2	N	2	TEST CRU BIT
X	0480	6	N	—	EXECUTE
XOP	2C00	9	N	6	EXTENDED OPERATION
XOR	2800	3	Y	0-2	EXCLUSIVE OR
DCA	2C00	9	N	0-3,5,7	DECIMAL CORRECT ADD
DCS	2C00	9	N	0-3,5,7	DECIMAL CORRECT SUB
LIIM	2C00	9	N	14,15	LOAD INTERRUPT MASK

ILLEGAL OP CODES 0000-01FF;0320-033F;0780-07FF;0C00-OFFF

INSTRUCTIONS BY OP CODE

OP CODE	MNEMONIC	OP CODE	MNEMONIC
0000-01FF	ILLEGAL	1000	JMP
0200	LI	1100	JLT
0220	AI	1200	JLE
0240	ANDI	1300	JEQ
0260	ORI	1400	JHE
0280	CI	1500	JGT
02A0	STWP	1600	JNE
02C0	STST	1700	JNC
02E0	LWPI	1800	JOC
0300	LIMI	1900	JNO
0320-033F	ILLEGAL	1A00	JL
0340	IDLE	1B00	JH
0360	RSET	1C00	JOP
0380	RTWP	1D00	SBO
03A0	CKON	1E00	SBZ
03C0	CKOF	1F00	TB
03E0	LREX	2000	COC
0400	BLWP	2400	CZC
0440	B	2800	XOR
0480	X	2C00	XOP
04C0	CLR	3000	LDCR
0500	NEG	3400	STCR
0540	INV	3800	MPY
0580	INC	3C00	DIV
05C0	INCT	4000	SZC
0600	DEC	5000	SZCB
0640	DECT	6000	S
0680	BL	7000	SB
06C0	SWPB	8000	C
0700	SETO	9000	CB
0740	ABS	A000	A
0780-07FF	ILLEGAL	B000	AB
0800	SRA	C000	MOV
0900	SRL	D000	MOVB
0A00	SLA	E000	SOC
0B00	SRC	F000	SOCB
0C00	ILLEGAL		

PSEUDO-INSTRUCTIONS

MNEMONIC	PSEUDO-INSTRUCTIONS	CODE GENERATED
NOP	NO OPERATION	1000
RT	RETURN	045B