5. PROGRAMMING EXAMPLES

(Decimal operation)

a. Decimal Addition:

Memory address of Augend; D and E is (ALPHA)
Memory address of Addend; H and L is (BETA)

Mnemonic	Operand	Explanation	Bytes	Comment
LXI	D, ALPHA	Load D and E Immediate	3	Set address to DE
LXI	H, BETA	Load H and L Immediate	3	Set address to HL
MVI	C, 8	Load C with "8"		
XRA		Exclusive or A with A	1	Clear Carry
LOOP: LDAX	D	Load A with (DE)	1	Load Augend to Acc
ADC	M	Add M to A (HL)	1	Add Addend to Augend
DAA		Decimal Adjust	1	
STAX	D	Store A to (DE)	1	Replace Result
INX	H	Increment HL	1	Renew address HL
INX	D	Increment DE	1	Renew address DE
DCR	C	Decrement C	1	Check end of calculation
JNZ	LOOP	If not zero go to loop	3	

Calculation time (16 digits) ~ 230 μsec

b. Decimal Subtraction

Memory address of Minuend; D and E (ALPHA)
Memory address of Subtrahend; H and L (BETA)

Mnemonic	Operand	Explanation	Bytes	Comment
LXI	D, ALPHA	Load D and E Immediate	3	Set address to DE
LXI	H, BETA	Load H and L Immediate	3	Set address to HL
MVI	C, 8	Load C with "8"	2	
STC		Set Carry	1	
LOOP: MVI	A, 99H	Load A with 99 HEX	2	$99_{16} + 1 = 9A_{16}$
ACI	0	Add with carry	2	
SUB	M	Subtract M from A	1	
XCHG		Exchange DE and HL	1	Actually
ADD	M	Add M to A	1	
DAA		Decimal Adjust	1	$3 - 2 = 10 - 2 + 3 = 11$
MOV	M, A	Load A to M	1	
XCHG		Exchange DE and HL	1	No borrow occurs here
INX	D	Increment DE	1	
INX	H	Increment HL	1	
DCR	C	Decrement C	1	
JNZ	LOOP		3	

Calculation time (16 digits) ~ 330 μsec

c. Binary Multiplication Loop

A contains Multiplier, D and E is Multiplicand, H and L are Partial Product

Mnemonic	Operand	Explanation	Bytes
LXI	H, 0	Initialize Partial Product to 0	3
MVI	B, 8	8 → B to control loop	2
LOOP: DAD	H	Shift partial product left and into carry	1
RAL		Rotate multiplier bit to carry	1
JNC	DEC	Test multiplier at carry	3
DAD	D	Add multiplicand to partial product if carry = 1	1
ACI	0		
DEC: DCR	B	Decrement B loop counter	1
JNZ	LOOP	Test to see if B = 0 to iterate 8 times	3

Calculation time for 8 x 16 multiply ~ 230 μsec

d. Accumulator Loading

Mnemonic	Operand	Explanation	Bytes
MOV	A, B	Load A with Register B	1
MVI	A, 23	Load A with Data Immediate "23"	2
LDA	4098	Load A with contents of memory LOC 4098	3
MOV	A, M	Load A using H and L as address	1
LDAX	B	Load A using B and C as address	1
LDAX	D	Load A using D and E as address	1
LHLD	4098	Load A indirect using LOC 4098	4
MOV	A, M		
POP	A	Load A with data from stack	1
IN	10	Load A with data from Device #10	2