

Lab 9: 8-Bit Computer Implementation Part II

17-Nov-03

INSTRUCTION	OP CODE	C	V	Z	S	DESCRIPTION	SYNTAX
Load Acc (Imm)	84	×	×	✓	✓	$A \leftarrow \text{mem}[\text{PC}]$	LDAI <data>
Load Acc (Abs)	88	×	×	✓	✓	$A \leftarrow \text{mem}(\text{mem}[\text{PC}])$	LDAA <address>
Load Acc (RR)	81	×	×	✓	✓	$A \leftarrow (D)$	LDAD
Store Acc (Abs)	F6	×	×	×	×	$\text{Mem}(\text{mem}[\text{PC}]) \leftarrow (A)$	STAA <address>
Store Acc (RR)	F1	×	×	×	×	$D \leftarrow (A)$	STAR D
Add with Carry	01	✓	✓	✓	✓	$A \leftarrow (A) + (D) + C$	ADCR D
Subtract with Borrow	11	✓	✓	✓	✓	$A \leftarrow (A) + \text{not}(D) + C$	SBCR D
Compare	91	✓	✓	✓	✓	Same as Subtract, but only change Status Flags (A is unchanged)	CMPR D
AND	21	×	×	✓	✓	$A \leftarrow (A) \text{ AND } (D)$	ANDR D
OR	31	×	×	✓	✓	$A \leftarrow (A) \text{ OR } (D)$	ORR D
XOR	41	×	×	✓	✓	$A \leftarrow (A) \text{ XOR } (D)$	XORR D
Shift Left Logical	51	✓	×	✓	✓	$C \leftarrow (A7), A7 \leftarrow A6, \dots, A0 \leftarrow 0$	SLRL
Shift Right Logical	61	✓	×	✓	✓	$C \leftarrow (A0), A0 \leftarrow A1, \dots, A7 \leftarrow 0$	SRRL
Rotate Left through Carry	52	✓	×	✓	✓	$C \leftarrow (A7), A7 \leftarrow A6, \dots, A0 \leftarrow C$	ROL C
Rotate Right through Carry	62	✓	×	✓	✓	$C \leftarrow (A0), A0 \leftarrow A1, \dots, A7 \leftarrow C$	ROR C
Branch on /C (Inh)	B0	×	×	×	×	if (C=0), $\text{PC} \leftarrow \text{mem}[\text{PC}]$ else PC++	BCCA
Branch on C (Inh)	B1	×	×	×	×	if (C=1), $\text{PC} \leftarrow \text{mem}[\text{PC}]$ else PC++	BCSA
Branch on Z (Inh)	B2	×	×	×	×	if (Z=1), $\text{PC} \leftarrow \text{mem}[\text{PC}]$ else PC++	BEQA
Branch on S (Inh)	B3	×	×	×	×	if (S=1), $\text{PC} \leftarrow \text{mem}[\text{PC}]$ else PC++	BMIA
Branch on /Z (Inh)	B4	×	×	×	×	if (Z=0), $\text{PC} \leftarrow \text{mem}[\text{PC}]$ else PC++	BNEA
Branch on /S (Inh)	B5	×	×	×	×	if (S=0), $\text{PC} \leftarrow \text{mem}[\text{PC}]$ else PC++	BPLA
Branch on /V (Inh)	B6	×	×	×	×	if (V=0), $\text{PC} \leftarrow \text{mem}[\text{PC}]$ else PC++	BVCA
Branch on V (Inh)	B7	×	×	×	×	if (V=1), $\text{PC} \leftarrow \text{mem}[\text{PC}]$ else PC++	BVSA
Decrement Acc	FB	×	×	✓	✓	$A \leftarrow (A) - 1$	DECA
Increment Acc	FA	×	×	✓	✓	$A \leftarrow (A) + 1$	INCA
Set Carry Flag	F8	✓	×	×	×	$C \leftarrow 1$	SETC
Clear Carry Flag	F9	✓	×	×	×	$C \leftarrow 0$	CLRC

Table 1: Small8 Instruction Set