OP   STEP

7 6 5 4 3 2 1 0

N4   No

N

MAR IN	$\overline{PC\ IN}$	PC Count	PC OUT		
0	1	0	0	PC→MAR	0x4
0	1	0	0		0x4
1	1	1	1	PC++	0xF
1	1	1	1		0xF
1	1	0	1		0x0
1	1	0	1		
1	1	0	1		

1 1 1 1 1 0 0 1
1 1 1 1 1 0 0 1

0 1 0 0

EE0

0 PC OUT
1 PC COUNT
2 PC IN
3 MAR IN
4 N0
5 N1
6 N2
7 N3

Mem ~~out write~~   ON
Read
I0-7   MDR   ON

I0-7 MDR OFF
Mem R OFF

Increment MAR

MUX STUFF → Mem R ON
I8-15   ON

Mem R OFF
I8-15   OFF

Increment MAR

Columns (top to bottom labels): MAR IN, PC IN, PC Count, PC O, MEMR, MEM W, MARI 8-15, MARI 0-7, 3S DR, 3S EN, ALU OE, ALU CE, ALU A2IE, ALU S3, ALU S2, ALU S1, ALU S0

N

```
1 0 1 0 | 1 0 0 1              Put 1010 in PC
          0 1 0 0 0        MAR ← PC
          1 1 0 1 0 1 1 0 0
          0 1 1 0 1 1 0 0 0
          1 1 0 1
```

Fetch

MAR ← PC, PC++

| 1 | PC ~~out on~~ OUT ON |
| | MAR In ON |

| 2 | WAIT? |

3	PC OUT OFF
	MAR IN OFF
	PC EN ON

| 4 | Wait |

| 5 | PC EN OFF |

clk

↓

IR Decoder

IR
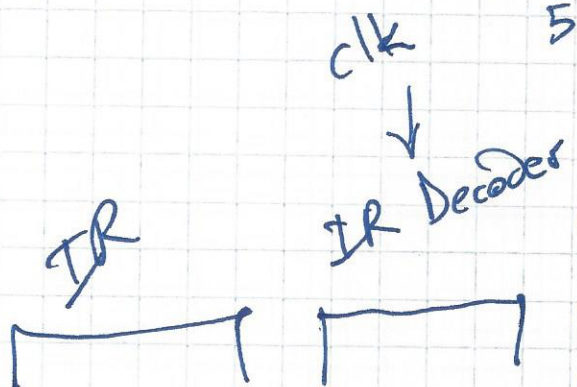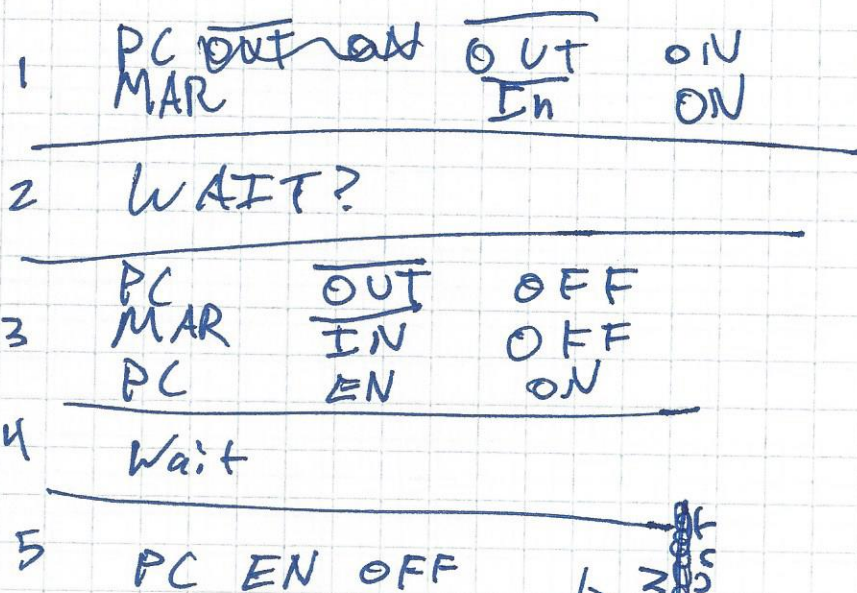
Op Code	Step
7 6 5 4	3 2 1 0
0 0 0 0	0 0 0 0
	0 0 0 1
	0 0 1 0
	0 0 1 1
	0 1 0 0

Logic

| 0 0 1 0 |
| 0 0 1 0 |
| 1 1 1 1 |
| 1 1 1 1 |
| 1 0 1 1 |

4 5 6 7

X	0	0	2
X	0	1	2
X	0	2	F
X	0	3	F
X	0	4	B

IR

MAR IN
PC EN
DEC IN / count
PC OUT

1	1	0	0	MAR IN
0	0	1	1	PC EN
0	0	0	0	DEC IN / count
1	0	0	1	PC OUT
1	0	0	1	

↓

3 to 1 MUX
Mode

2:1 MUX

X3

2:1 MUX

PC IN
PC COUNT 2 → 0
PC OUT

SAME
EN
Clock

	IR I/O	BR	RC I/O	ALU OE	ALU CE	ALUR$_2$E	RF R	RF 3	RF A1	RF A0	RFM I	RFM O

~~IR~~ ~~PC~~
PC → IR
IR → BUS → RFM   0 0   1 1 0
   IMMS → SR2

SR2 → RFM   ~~1010~~
IR ON   (Always On?)   1 0 1 0
RM
_____
                                                          0 1

Fetch

   Mem → IR

MAR ← PC , PC++

MDR ← MEM

IR ← MDR