

3 Control Transfer Instructions and Time Delay Generation

- There are 5 types of instructions
 - One of which is MOV, MOVC, MOVX
- No one uses JMP.
 - Because it's a bit difficult to work with — as apposed to a long jump.
- NOP is literally do nothing
 - It's to kill time.
- Let's multiply 5×5

JZ Multiply By 5

```
ORG 0

MOV R0, #5
MOV R1, #0

MOV A, #0

LOOP:  MOV A, R1
        ADD A, #5

        MOV R1, A
        MOV A, R0

        DEC A
        JNZ A, LOOP

END
```

DJNZ Multiply By 5

```
ORG 0

MOV R0, #5
MOV A, #0

LOOP:  ADD A, #5
       DJNZ R0, Loop

END
```

Nested Loop

Load A with 5, add 10 for 300 times.

```
ORG 0

MOV A, #5

MOV R0, #3

LOOP2: MOV R1, #100    ; Runs 3 times
LOOP1: ADD A, #10      ; Runs 100 times
                          ; 3x100 = 300 times

       DJNZ R1, LOOP1
       DJNS R0, LOOP2
```

- $1 \text{ MC} = 1.0852\mu\text{s}$ — **KNOW THIS!**
- For slides, the values (in order) of the delay is

Machine Cycle	Times
1	1
1	∞
2	∞
1	∞
2	∞
1	∞
2	$200 \times \infty$
2	$1 \times \infty$

Delay Example

DELAY: MOV R0, #251

DL1: MOV R1, #182

DL2: DJNZ R1, DL2

DJNZ R0, DL1

RET