INSTITUTO POLITÉCNICO NACIONAL

ESCUELA SUPERIOR DE CÓMPUTO

INTRODUCCIÓN A LOS MICROCONTOLADORES

HERNÁNDEZ GARCÍA EVA NATALIA

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"SERVOMOTOR"

GRUPO: 3CM10

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1 | DIAGRAMAS

2 | CÓDIGO

```
.include"m8535def.inc"
.def d = R16

rjmp main
rjmp m1
rjmp m2
.org $12
rjmp m3


main:

  ldi  r19, 19
L0:

    ;Cambia a 1
        ldi d, $80
        out portd, d

    ;Dura 1 ms
        ldi  r23, 2
        ldi  r22, 70
    L01: dec  r22
        brne L01
        dec  r23
        brne L01


    ;Cambia a 0
        ldi d, 0
        out portd, d

    ;Para los 19 ms

        ldi  r24, 25
        ldi  r21, 172
    L02: dec  r21
       brne L02
        dec  r24
        brne L02
    ;-----------------
```

```
    ;Decrementa 1 ciclo
        dec  r19
        brne L0


    ldi d, low(ramend)
    out spl,d
    ldi d, high(ramend)
    out sph,d
    ser d
    out ddrc,d
    out ddra,d
    out portb,d
    ldi d, $0F
    out portd,d
    ldi d, $F0
    out ddrd,d
    ldi d,2
    out mcucr,d
    ldi d,$e0
    out gicr,d
    sei
    ldi d,$40; -
    mov r0,d ;
    mov r5,d ;
    mov r4,d
    mov r3,d
    mov r2,d
    mov r1,d
    clr zh


barre:
    ldi zl,5
    ldi d,$20
```

```
sigue:
    out portc,d
    ld r17,z
    out porta, r17
    rcall delay
    out porta,zh
    in d,pinc
    lsr d
    dec z1
    brpl sigue
    rjmp barre
m1:
    ldi d,$40 ;-- -
    mov r0,d ;
    mov r5,d ;
    ldi d,$3F ;- O
    mov r4,d
    ldi d,$50 ;- R
    mov r3,d
    ldi d,$79 ;- E
    mov r2,d
    ldi d,$39 ;  -C
    mov r1,d

    ldi  r19, 19
    L1:

        ;Cambia a 1
            ldi d, $80
            out portd, d

        ;Dura 1 ms
            ldi  r23, 2
            ldi  r22, 70
        L11: dec  r22
            brne L11
            dec  r23
            brne L11


        ;Cambia a 0
            ldi d, 0
            out portd, d
```

```
        ;Para los 19 ms

            ldi  r24, 25
            ldi  r21, 172
        L12: dec  r21
            brne L12
            dec  r24
            brne L12
        ;-----------------

        ;Decrementa 1 ciclo
            dec  r19
            brne L1


reti

m2:
    ldi d,$40 ;-- -
    mov r0,d  ;
    mov r1,d  ;
    mov r5,d
    mov r4,d  ;
    ldi d,$6D ; 5
    mov r3,d
    ldi d,$66 ; 4
    mov r2,d

    ldi  r19, 19

    L2:

        ;Cambia a 1
            ldi d, $80
            out portd, d
```

```
        ;Dura 1.5 ms
            ldi  r23, 1
            inc  r23
            ldi  r22, 241
        L21: dec  r22
            brne L21
            dec  r23
            brne L21
            inc r23

        ;Cambia a 0
            ldi d, 0
            out portd, d

        ;Para los 18.5 ms

            ldi  r24, 25
            ldi  r21, 5
        L22: dec  r21
            brne L22
            dec  r24
            brne L22

        ;-----------------

        ;Decrementa 1 ciclo
            dec  r19
            brne L2


reti

m3:
    ldi d,$40 ;-- -
    mov r0,d  ;
    mov r1,d  ;
    mov r5,d
    mov r4,d  ;
    ldi d,$3F ; 0
    mov r3,d
    ldi d,$6F ; 9
    mov r2,d
```

```
    ldi  r19, 19
    L3:

        ;Cambia a 1
            ldi d, $80
            out portd, d

        ;Dura 2 ms
            ldi  r23, 1
            inc  r23
            inc  r23
            ldi  r22, 241
        L31: dec  r22
            brne L31
            dec  r23
            brne L31

        ;Cambia a 0
            ldi d, 0
            out portd, d

        ;Para los 18 ms

            ldi  r24, 25
            ldi  r21, 5
        L32: dec  r21
            brne L32
            dec  r24
            brne L32

        ;-----------------

        ;Decrementa 1 ciclo
            dec  r19
            brne L3

reti
```

```
delay:
    ldi r17,$0b
    p0:
        ldi r18,$d3
    p1:
        dec r18
        brne p1
        dec r17
        brne p0
        ldi r17,$01
    p2:
        dec r17
        brne p2
        nop
ret
```