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**    PROGRAMA PARA EL INDUCTOMETRO/CAPACIMETRO **
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**                                            **
**    MICROCONTROLADOR MC68HC908QY4A          **
**                                            **
**          ENERO DE 2014                     **
**                                            **
**       RICARDO JAVIER BORELLI               **
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$BASE 10T

RAM_START  EQU  $0080
ROM_START  EQU  $EE00
VECTORS    EQU  $FFDE
PTA        EQU  $0000
PTB        EQU  $0001
DDRA       EQU  $0004
DDRB       EQU  $0005
CONFIG2    EQU  $001E
CONFIG1    EQU  $001F
TOF        EQU   7
TSC        EQU  $0020
TCNTH      EQU  $0021
TCNTL      EQU  $0022
OSCSC      EQU  $0036
E          EQU   0
RWR        EQU   5
RS         EQU   4

************************************
***********VARIABLES DE RAM**********
           ORG  RAM_START
AUX      RMB   1

COSA     RMB   1


FRECH    RMB   1
FRECL    RMB   1

AUXI     RMB   1
DH       RMB   1
DM       RMB   1
DL       RMB   1
DNDAH    RMB   1
DNDAM    RMB   1
DNDAL    RMB   1
DNDH     RMB   1
DNDM     RMB   1
DNDL     RMB   1
DSRH     RMB   1
DSRM     RMB   1
DSRL     RMB   1
QH       RMB   1
QM       RMB   1
QL       RMB   1
PRODH    RMB   1
PRODMH   RMB   1
PRODML   RMB   1
PRODL    RMB   1
MNDH     RMB   1
MNDL     RMB   1
MNDAH    RMB   1
MNDAL    RMB   1
MDRH     RMB   1
MDRL     RMB   1
UNDEC    RMB   1
CENTML   RMB   1
DECEMIL  RMB   1
UMLDML   RMB   1
CMLMML   RMB   1
B        RMB   1
MSB      RMB   1
MHSB     RMB   1
MLSB     RMB   1
LSB      RMB   1
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REFH      RMB   1
REFL      RMB   1
INCOGH    RMB   1
INCOGL    RMB   1
BYTE      RMB   1
MSTRA     RMB   1
RESH      RMB   1
RESM      RMB   1
RESL      RMB   1
CONT      RMB   1
OCONT     RMB   1

RANGO     RMB   1
MARK      RMB   1
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            ORG  ROM_START
START:
            CLR  OSCSC   ; Oscilador interno a 4 MHz
            RSP          ;INICIALIZACION DEL MICROCONTROLADOR
            CLRA
            CLRH
            CLRX
            CLC

            MOV  #%00001001,CONFIG1   ;PROGRAMACION DE LOS CONFIGS
            NOP
            NOP
            MOV  #%10000000,CONFIG2
            NOP
            NOP

            MOV  #$FF,DDRB             ;PUERTO B TODO COMO SALIDA
            MOV  #%00110001,DDRA       ;PTA5, PTA4 Y PTA3 SON SALIIDAS. PTA2, PTA1 Y PTA0 SON ENTRAD
AS


            CLR  PTA
            CLR  PTB
            JSR  RETARDO


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INICIO_LCD:                            ;PREPARA AL MODULO LCD PARA MODO 8 BITS


            LDA  #%00111000
            JSR  ESCRIBE_IR
            LDA  #%00001110
            JSR  ESCRIBE_IR
            LDA  #%00000001
            JSR  ESCRIBE_IR
            LDA  #%00000110
            JSR  ESCRIBE_IR
            LDA  #%01000000
            JSR  ESCRIBE_IR
            LDA  #%00001100
            JSR  ESCRIBE_IR
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***********************
SALUDO:
            LDA  #$01                 ;CLEAR DISPLAY
            JSR  ESCRIBE_IR
            LDA  #$0C                 ;DISPLAY ON
            JSR  ESCRIBE_IR

            LDA  #%10000011           ;SET DDRAM $03. Va a la posicion 3 de la primera fila
            JSR  ESCRIBE_IR
            LDX  #$15
            LDA  TABLA,X                ;c
            JSR  ESCRIBE_DR
            LDX  #$14
            LDA  TABLA,X                ;a
            JSR  ESCRIBE_DR
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          LDX  #$1C
          LDA  TABLA,X               ;r
          JSR  ESCRIBE_DR

          JSR  RETARDO               ;Retardo para dar tiempo a que se lea el nombre
          JSR  RETARDO
          JSR  RETARDO
          JSR  RETARDO
          JSR  RETARDO
          JSR  RETARDO
          JSR  RETARDO
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**********************
          LDA  #$01         ;CLEAR DISPLAY
          JSR  ESCRIBE_IR
*****************************************************************************************
**********************
ESCRIBE_IR:                  ;SUBRUTINA QUE SIRVE PARA MANDARLE INSTRUCCIONES AL MODULO LCD
          BCLR  RS,PTA
          BCLR  RWR,PTA
          BSET  E,PTA
          STA   PTB
          JSR   DEMORA100
          BCLR  E,PTA
          JSR   DEMORA100
          BCLR  RS,PTA
          RTS
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ESCRIBE_DR:                  ;SUBRUTINA QUE SIRVE PARA MANDARLE DATOS (CARACTERES) AL MODULO LCD
          BSET  RS,PTA
          BCLR  RWR,PTA
          BSET  E,PTA
          STA   PTB
          JSR   DEMORA100
          BCLR  E,PTA
          JSR   DEMORA100
          BCLR  RS,PTA
          RTS
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RETARDO
        PSHA
        PSHH
        PSHX
        LDA     #$FF
DELAY
        LDHX    #$00EF
LOOP1
        AIX     #-1
        CPHX    #0
        BNE     LOOP1
        DECA
        BNE     DELAY
        PULX
        PULH
        PULA
        RTS
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DEMORA100:                       ;RUTINA QUE GENERA UNA DEMORA DE APROX.
          PSHA
          LDA  #$FF
RESTA3:
          DECA
          BNE  RESTA3

          PULA
          RTS
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TABLA:                           ;TABLA EN DONDE SE DEFINEN LOS CARACTERES QUE SE USARAN
          DB  %00110000;0 X = $00
          DB  %00110001;1 X = $01
          DB  %00110010;2 X = $02
          DB  %00110011;3 X = $03
          DB  %00110100;4 X = $04
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          DB  %00110101;5 X = $05
          DB  %00110110;6 X = $06
          DB  %00110111;7 X = $07
          DB  %00111000;8 X = $08
          DB  %00111001;9 X = $09
          DB  %01010000;P X = $0A
          DB  %01010010;R X = $0B
          DB  %01010100;T X = $0C
          DB  %01010101;U X = $0D
          DB  %01000011;C X = $0E
          DB  %01000101;E X = $0F
          DB  %01000110;F X = $10
          DB  %01001000;H X = $11
          DB  %01001100;L X = $12
          DB  %01001110;N X = $13
          DB  %01100001;a X = $14
          DB  %01100011;c X = $15
          DB  %01100111;g X = $16
          DB  %01101001;i X = $17
          DB  %01101010;j X = $18
          DB  %01101100;l X = $19
          DB  %01101111;o X = $1A
          DB  %01110000;p X = $1B
          DB  %01110010;r X = $1C
          DB  %01110011;s X = $1D
          DB  %01110101;u X = $1E
          DB  %00101110;punto X = $1F
          DB  %00101100;coma X = $20
          DB  %00111111;pregunta X = $21
          DB  %00111101;igual X = $22
          DB  %00000000; mu X=$23
          DB  %00100000;ESPACIO X=$24
          DB  %00000001; Yaz X=$25
          DB  %01100101;e  X = $26
          DB  %00111010;dos puntos X = $27
          DB  %01101110;n  X = $28
          DB  %01000010;B  X = $29
          DB  %01100100;d  X = $2A
          DB  %01001010;J  X = $2B
          DB  %01110110;v  X = $2C
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BOBO                      ;Rutina para los vectores no utilizados. Se pone "por las dudas"
          NOP
          RTI
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*************************************TABLA DE VECTORES*************************************************
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          ORG  VECTORS

          DW   BOBO  ;FFDE-FFDF
          DW   BOBO  ;FFE0-FFE1
          DW   BOBO  ;FFE2-FFE3
          DW   BOBO  ;FFE4-FFE5
          DW   BOBO  ;FFE6-FFE7
          DW   BOBO  ;FFE8-FFE9
          DW   BOBO  ;FFEA-FFEB
          DW   BOBO  ;FFEC-FFED
          DW   BOBO  ;FFEE-FFEF
          DW   BOBO  ;FFF0-FFF1
          DW   BOBO  ;FFF2-FFF3
          DW   BOBO  ;FFF4-FFF5
          DW   BOBO  ;FFF6-FFF7
          DW   BOBO  ;FFFF8-FFF9
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          DW   BOBO  ;FFFA-FFFB
          DW   BOBO  ;FFFC-FFFD
          DW   START ;FFFE-FFFF
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END
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