```
' ================================================================================
'
'   File....... SW21-EX33-DS1307-AmPm.BSP   MODIFIED 05/15/2009  DAW
'   Purpose.... Real-time-clock interfacing
'   Author..... (C) 2000 - 2005, Parallax, Inc.
'   E-mail..... support@parallax.com
'   Started....
'   Updated.... 16 AUG 2006
'
'   {$STAMP BS2p}
'   {$PBASIC 2.5}
'
' ================================================================================


' -----[ Program Description ]----------------------------------------------
'
' This program demonstrates the access and control of an external real-
' time-clock chip, the DS1307. In this version, the time values (hours
' and minutes) are combined into a single value for simplified
' manipulation of time.

' -----[ I/O Definitions ]--------------------------------------------------

TX              PIN     15              ' serial output to LCD


' -----[ Constants ]-------------------------------------------------------


    T9600       CON     240

LcdBaud         CON     T9600

LcdCommand      CON     $FE             ' Command Mode
LcdCls          CON     $58             ' Clear Screen use pause after
LcdPos          CON     $47             ' append with Col, Row data
LcdHome         CON     $48             ' Move to home position
LcdBkSpc        CON     $4C             ' move cursor left
LcdRt           CON     $4D             ' move cursor right
LcdUnder        CON     $4A             ' Turn on underline Cursor
LcdUnderoff     CON     $4B             ' Turn off underline Cursor
LcdBlink        CON     $53             ' Turn on Blinking Block Cursor
LcdBlinkoff     CON     $54             ' Turn off Blinking Block Cursor


' -----[ Initialization ]---------------------------------------------------

Reset:
  HIGH TX                               ' setup serial output pin
  PAUSE 100                             ' allow LCD to initialize

SEROUT TX, LcdBaud,[LcdCls]
PAUSE 100

' -----[ I/O Definitions ]--------------------------------------------------

SDA             PIN     0                       ' I2C serial data line
SCL             PIN     1                       ' I2C serial clock line

' -----[ Constants ]-------------------------------------------------------

Ack             CON     0                       ' acknowledge bit
Nak             CON     1                       ' no ack bit

```

```
 66 DS1307          CON     %1101 << 4
 67
 68 ' -----[ Variables ]-------------------------------------------------------
 69
 70 secs            VAR     Byte                    ' DS1307 time registers
 71 mins            VAR     Byte
 72 hrs             VAR     Byte
 73 day             VAR     Byte                    ' weekday
 74 date            VAR     Byte                    ' day in month, 1 - 31
 75 month           VAR     Byte
 76 year            VAR     Byte
 77 control         VAR     Byte                    ' SQW I/O control
 78
 79 idx             VAR     Nib                     ' loop control
 80 pntr            VAR     Byte                    ' ee pointer
 81 char            VAR     Byte                    ' character for display
 82 rawTime         VAR     Word                    ' 0 - 1439
 83
 84
 85 ' -----[ EEPROM Data ]-----------------------------------------------------
 86
 87 DayNames        DATA    "Sunday  Monday  Tuesday Wedsday Thusday Friday  Saturday"
 88
 89
 90 ' -----[ Initialization ---- only on first start up ]-----------------------------------------
    ------
 91
 92 Setup_LCD:
 93   SEROUT TX, LcdBaud, [LcdCommand, LcdCls]      ' Clear LCD
 94   PAUSE 5                                       ' Wait till done
 95   SEROUT TX, LcdBaud, [LcdCommand, LcdUnderOff] ' Cursor Off
 96   PAUSE 5                                       ' Wait a time
 97
 98
 99 ' -----[ Program Code ]---------------------------------------------------
100
101 Main:
102   GOSUB Get_Clock                               ' read DS1307
103   hrs = hrs & $3F
104   hrs = hrs.NIB1 * 10 + hrs.NIB0                ' BCD to decimal
105   mins = mins.NIB1 * 10 + mins.NIB0
106   rawTime = hrs * 60 + mins
107
108   SEROUT TX, LcdBaud, [LcdCommand, LcdHome]     ' Put Cursor Home
109
110     hrs = 12 - (24 - (rawTime / 60) // 12)
111     mins = rawTime // 60
112
113     SEROUT TX, LcdBaud, [DEC2 hrs, ":", DEC2 mins, ":", HEX2 secs]
114
115
116     IF (rawTime < 720) THEN
117
118       SEROUT TX, LcdBaud, [" AM "]
119
120     ELSE
121
122       SEROUT TX, LcdBaud, [" PM "]
123
124     ENDIF
125
126
127   GOSUB Print_Day
128  ' ---------------------------------- Start all over again --------------
129   GOTO Main
```

```
130
131
132 ' -----[ Subroutines ]------------------------------------------------------
133
134 Print_Day:
135   pntr = DayNames + ((day - 1) * 8)            ' point to 1st char
136   FOR idx = 0 TO 7                             ' print 8 letters
137     READ (pntr + idx), char                    ' read letter
138
139   SEROUT TX, LcdBaud, [ char ]
140    NEXT
141
142   RETURN
143
144 ' Do a block read from clock registers
145
146 Get_Clock:
147   PAUSE 1000                                    ' wait 1000 ms  CHANGE IF MORE CODE IS ADDED !!!
148   I2CIN SDA, DS1307, 0, [STR secs\8]            ' retrieve clock registers
149   RETURN
```