PWM FUNCTIONS

The information in this document is obtained from the following Microchip manuals:
- PIC18Fxx2 Datasheet
- PICmicro® 18C MCU Family Reference Manual
- MPLAB C18 C Compiler Libraries

Function Prototypes:
For a detailed description of these functions, please see:
Section 2.7 Pulse-Width Modulation Functions, in MPLAB C18 C Compiler Libraries manual.

```c
#include <pwm.h>

void OpenPWM1 ( char PR2 ); // Configure PWM channel x.
vvoid OpenPWM2 ( char PR2 );

void SetDCPWM1 ( unsigned int dutycycle ); // Write a new duty cycle value to PWM channel x.
vvoid SetDCPWM2 ( unsigned int dutycycle );

void ClosePWM1 ( void ); // Disable PWM channel x.
vvoid ClosePWM2 ( void );
```

Notes:

1. PR2 can be any value from 0x00 to 0xff. This value determines the PWM frequency by using the following formula:

   \[ \text{PWM period} = \left( \frac{\text{PR2}}{0} + 1 \right) \times 4 \times \text{TOSC} \times \text{TMR2 prescaler} \]

2. The value of dutycycle can be any 10-bit number. Only the lower 10-bits of dutycycle are written into the duty cycle registers. The duty cycle, determines the high time of the PWM waveform.

3. PWM uses TIMER2 for time base. In addition to opening the PWM, TIMER2 must also be opened with an OpenTimer2(...) statement before the PWM will operate.

4. TIMER2 postscaler is not used in the determination of the PWM frequency. TIMER2 postscaler could be used to generate TMR2 interrupts at a different frequency than the PWM output.

5. Example PWM Frequencies and Bit Resolutions at 20 MHz:

<table>
<thead>
<tr>
<th>PWM Frequency</th>
<th>1.22 kHz</th>
<th>4.88 kHz</th>
<th>19.53 kHz</th>
<th>78.12 kHz</th>
<th>156.3 kHz</th>
<th>208.3 kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timer Prescaler (1, 4, 16)</td>
<td>16</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>PR2 Value</td>
<td>0xFF</td>
<td>0xFF</td>
<td>0xFF</td>
<td>0x3F</td>
<td>0x1F</td>
<td>0x17</td>
</tr>
<tr>
<td>Maximum Resolution (bits)</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>8</td>
<td>7</td>
<td>5.5</td>
</tr>
</tbody>
</table>

6. According to the table shown above, the lowest PWM frequency (with a 20 MHz oscillator) is 1.22 kHz, since TIMER2 prescaler and PR2 register are at their maximum values. The maximum PWM frequency is 19.53 kHz. Even higher PWM frequencies up to 208.3 kHz are achievable, but at the cost of less than 10 bits of duty cycle resolution as shown in the last row of the table.