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ISBN:
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## Chapter 2. Demonstration Application on PWSB

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NOTICE TO CUSTOMERS
All documentation becomes dated, and this manual is no exception. Microchip tools and
documentation are constantly evolving to meet customer needs, so some actual dialogs
and/or tool descriptions may differ from those in this document. Please refer to our web site
(www.microchip.com) to obtain the latest documentation available.

Documents are identified with a “DS” number. This number is located on the bottom of each
page, in front of the page number. The numbering convention for the DS number is
“DSXXXXX A”, where “XXXXX” is the document number and “A” is the revision level of the
document.

For the most up-to-date information on development tools, see the MPLAB® IDE online help.
Select the Help menu, and then Topics to open a list of available online help files.

INTRODUCTION
This chapter contains general information that will be useful to know before using the
PIC24FJ128GC010. Items discussed in this chapter include:
• Document Layout
• Conventions Used in this Guide
• Warranty Registration
• Recommended Reading
• The Microchip Web Site
• Development Systems Customer Change Notification Service
• Customer Support
• Revision History

DOCUMENT LAYOUT
The document is organized as follows:
• Chapter 1. “Introduction to Portable Weather Station Board” – This chapter
introduces the Portable Weather Station Board (PWSB) and provides an overview
of its features.
• Chapter 2. “Demonstration Application on PWSB” – This chapter illustrates
PWSB preprogrammed application.
• Chapter 3. “Troubleshooting” – This chapter lists some troubleshooting
scenarios for user’s reference.
• Appendix A. “PWSB Schematics” – This appendix provides schematic
diagrams for the PWSB.
• Appendix B. “LCD Panel Information” – This appendix provides the LCD panel
information of the PWSB.
CONVENTIONS USED IN THIS GUIDE

This manual uses the following documentation conventions:

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<th>Represents</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Arial font:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Italic characters</td>
<td>Referenced books</td>
<td><em>MPLAB&lt;sup&gt;®&lt;/sup&gt; IDE User’s Guide</em></td>
</tr>
<tr>
<td></td>
<td>Emphasized text</td>
<td><em>...is the only compiler...</em></td>
</tr>
<tr>
<td>Initial caps</td>
<td>A window</td>
<td>the Output window</td>
</tr>
<tr>
<td></td>
<td>A dialog</td>
<td>the Settings dialog</td>
</tr>
<tr>
<td></td>
<td>A menu selection</td>
<td>select Enable Programmer</td>
</tr>
<tr>
<td>Quotes</td>
<td>A field name in a window or dialog</td>
<td>“Save project before build”</td>
</tr>
<tr>
<td>Underlined, italic text with right angle bracket</td>
<td>A menu path</td>
<td><em>File</em>&lt;sup&gt;*&lt;/sup&gt;<em>Save</em></td>
</tr>
<tr>
<td>Bold characters</td>
<td>A dialog button</td>
<td>Click OK</td>
</tr>
<tr>
<td></td>
<td>A tab</td>
<td>Click the Power tab</td>
</tr>
<tr>
<td>N'Rnnnn</td>
<td>A number in verilog format, where N is the total number of digits, R is the radix and n is a digit.</td>
<td>4'b0010, 2'hF1</td>
</tr>
<tr>
<td>Text in angle brackets &lt; &gt;</td>
<td>A key on the keyboard</td>
<td>Press &lt;Enter&gt;, &lt;F1&gt;</td>
</tr>
</tbody>
</table>

| **Courier New font:** | | |
| Plain Courier New | Sample source code | `#define START` |
| | Filenames | `autoexec.bat` |
| | File paths | `c:\mcc18\h` |
| | Keywords | `_asm, _endasm, static` |
| | Command-line options | `-Opa+, -Opa-` |
| | Bit values | 0, 1 |
| | Constants | `0xFF, ‘A’` |
| Italic Courier New | A variable argument | `file.o`, where *file* can be any valid filename |
| Square brackets [ ] | Optional arguments | `mcc18 [options] file [options]` |
| Curly brackets and pipe character: { | Choice of mutually exclusive arguments; an OR selection | `errorlevel {0|1}` |
| Ellipses... | Replaces repeated text | `var_name [, var_name...]` |
| | Represents code supplied by user | `void main (void) { ... }` |
WARRANTY REGISTRATION

Please complete the enclosed Warranty Registration Card and mail it promptly. Sending in the Warranty Registration Card entitles users to receive new product updates. Interim software releases are available at the Microchip web site.

RECOMMENDED READING

This user's guide describes how to use PIC24FJ128GC010. Other useful documents are listed below. The following Microchip documents are available and recommended as supplemental reference resources.

Release Notes for MPLAB ICD 3 In-Circuit Debugger

For the latest information on using PIC24FJ128GC010, read the "Readme for PIC24FJ128GC010.htm" file (an HTML file) in the Readmes subdirectory of the MPLAB IDE installation directory. The release notes (Readme) contains update information and known issues that may not be included in this user's guide.
THE MICROCHIP WEB SITE

Microchip provides online support via our web site at www.microchip.com. This web site is used as a means to make files and information easily available to customers. Accessible by using your favorite Internet browser, the web site contains the following information:

- **Product Support** – Data sheets and errata, application notes and sample programs, design resources, user’s guides and hardware support documents, latest software releases and archived software
- **General Technical Support** – Frequently Asked Questions (FAQs), technical support requests, online discussion groups, Microchip consultant program member listing
- **Business of Microchip** – Product selector and ordering guides, latest Microchip press releases, listing of seminars and events, listings of Microchip sales offices, distributors and factory representatives

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The Development Systems product group categories are:

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- **Emulators** – The latest information on Microchip in-circuit emulators. This includes the MPLAB REAL ICE™ and MPLAB ICE 2000 in-circuit emulators.

- **In-Circuit Debuggers** – The latest information on the Microchip in-circuit debuggers. This includes MPLAB ICD 3 in-circuit debuggers and PICkit™ 3 debug express.

- **MPLAB® IDE** – The latest information on Microchip MPLAB IDE, the Windows® Integrated Development Environment for development systems tools. This list is focused on the MPLAB IDE, MPLAB IDE Project Manager, MPLAB Editor and MPLAB SIM simulator, as well as general editing and debugging features.

- **Programmers** – The latest information on Microchip programmers. These include production programmers such as MPLAB REAL ICE in-circuit emulator, MPLAB ICD 3 in-circuit debugger and MPLAB PM3 device programmers. Also included are nonproduction development programmers such as PICSTART® Plus and PICkit 2 and 3.
CUSTOMER SUPPORT

Users of Microchip products can receive assistance through several channels:

- Distributor or Representative
- Local Sales Office
- Field Application Engineer (FAE)
- Technical Support

Customers should contact their distributor, representative or FAE for support. Local sales offices are also available to help customers. A listing of sales offices and locations is included in the back of this document.

Technical support is available through the web site at:

http://www.microchip.com/support.

REVISION HISTORY

Revision A (March 2016)

This is the initial release of this document.
Chapter 1. Introduction to Portable Weather Station Board

The Portable Weather Station Board (PWSB) is a customer engagement board, intended to demonstrate the on-chip peripheral features of PIC24 GC “Intelligent Analog” family of devices.

1.1 OVERVIEW

The PWSB demo intends to showcase Analog, Capacitive touch, LCD, RTCC, VBAT and XLP features of PIC24FJ128GC010 microcontrollers. For more information refer to http://www.microchip.com/PIC24FJ128GC010.

- Analog features:
  - A high-speed (up to 10 Msps), 12-bit A/D converter with multiple input channels
  - A high-resolution, 16-bit Sigma-Delta A/D converter with two input channels
  - mTouch™ capacitive sensing with multiple input channels
- Analog sensors that are interfaced with A/D converters include:
  - Ambient Light sensor
  - Temperature sensor
  - Humidity sensor
  - Air Quality sensor

The PIC24F device drives an on-board Dot-Matrix LCD (8 commons by 59 Segments). The LCD displays the sensor readings and Real-Time Clock and Calendar (RTCC). This demo uses an 8 MHz external crystal and runs at 16 MHz (8 MIPS).

1.1.1 XLP Technology

XLP technology uses a combination of proprietary process geometry design techniques, as well as power management features, to reduce power consumption wherever possible. A key part of this strategy is the use of operating modes: a range of software-selectable hardware configurations that allow an application to change its power consumption during run time are implemented.

The demo has five selectable operating modes:

- Idle mode: CPU is OFF. All peripherals are ON. LCD displays either sensor readings or RTCC.
- Run mode: CPU and peripherals are ON. LCD displays either sensor readings or RTCC.
- Sleep mode: CPU and peripherals (except RTCC and LCD) are OFF. All sensors are turned OFF. Touch buttons are inactive. LCD Screen displays time in hh:mm format. The screen gets updated once every minute.
- Deep Sleep mode: CPU and peripherals (except RTCC) are OFF. The device can wake up from deep sleep using INT0 interrupt (Wake-up Switch assertion).
- VBAT mode: RTCC runs with VBAT (no VDD supply).
For more information on power saving mode and XLP features refer to:

- XLP Application Note AN1267
- Power saving features with deep sleep PIC24FRM
  http://www.microchip.com/PIC24FJ128GC010

**FIGURE 1-1: DEMO MODES STATE MACHINE**
1.2 HARDWARE

Figure 1-2 identifies the major components of the PWSB.

Components of PWSB marked in Figure 1-2 are described in Table 1-1.
TABLE 1-1: PWSB COMPONENTS - FRONT AND BACK VIEWS

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<thead>
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<th>Number</th>
<th>Description</th>
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<td>Deep Sleep/Wake-up Push Button (SW1)</td>
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<td>3</td>
<td>CR2032 Battery Holder (V BAT)</td>
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<td>4</td>
<td>Ambient Light Sensor (Q2)</td>
</tr>
<tr>
<td>5</td>
<td>Microchip MCP9700 Temperature Sensor (U4)</td>
</tr>
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<td>6</td>
<td>AA Power Jumper (JP1)</td>
</tr>
<tr>
<td>7</td>
<td>mTouch™ Navigation Touch Pads</td>
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<td>8</td>
<td>AA Battery Holder (BT2)</td>
</tr>
<tr>
<td>9</td>
<td>Humidity Sensor (U3)</td>
</tr>
<tr>
<td>10</td>
<td>Air Quality Sensor (U5)</td>
</tr>
<tr>
<td>11</td>
<td>Microchip MCP16251 Boost Regulator</td>
</tr>
<tr>
<td>12</td>
<td>Microchip PIC24FJ128GC010 16-Bit MCU (U1)</td>
</tr>
</tbody>
</table>

Components listed in Table 1-1 are discussed in the following sections:

1.2.1 LCD Display

This LCD display panel is organized as a 59-segment by 8-column display. However, the demo utilizes only a 54 x 8 dot-matrix array for alphanumeric or special characters. The LCD panel is directly driven from the I/O pins of the PIC24FJ128GC010 microcontroller, a separate display controller is not required. Multiplexing of the display elements is described in Appendix B. “LCD Panel Information”.

1.2.2 Deep Sleep/Wake-up Push Button (SW1)

This is normally a pulled-high push button connected to the port pin, RD0. Asserting this button pulls down RD0 to logic low (ground). As described in 2.4.7 “Sleep Mode” and 2.4.8 “Deep Sleep Mode” the demo application uses this switch to:

• Turn ON and OFF LCD backlight in Run mode
• Force the device to enter Deep Sleep mode from Sleep mode
• Wake up the device from Deep Sleep mode

1.2.3 CR2032 Battery Holder (BT1)

The CR2032 battery powers RTCC and Deep Sleep semaphore (DSGPRx) registers of PIC24FJ128GC010 microcontroller in the absence of main VDD (AA batteries).

1.2.4 Ambient Light Sensor (Q2)

Q2 is an ambient light sensor (ALS-PT19) consisting of phototransistor in miniature SMD, used to detect indoor ambient light level. The sensor is designed to output a current in the range of 1 μA to 200 μA, proportionate to the varying light flux, from 0 lux to 1000 lux.

Disclaimer: The ambient light measured is dependent on the resistor R8. In PWSB R8 is 30k resulting in a maximum ambient light measurement of 500 lux.

1.2.5 Temperature Sensor (U4)

Microchip’s MCP9700 is an analog temperature sensor and measures temperature from -40°C to +150°C. The MCP9700 provides a low-cost solution for applications that require measurement of a relative change of temperature.

The Temperate sensor is turned ON only in the Temperature screen.
For more information on MCP9700 temperature sensor refer to data sheet (DS20001942F)

www.microchip.com/MCP9700

Disclaimer:
The temperature sensor has an accuracy of ± 2°C (typical) from 0°C to +70°C

1.2.6 AA Power Jumper (JP1)
The jumper JP1 is used to power the board from two AA batteries. The default setting is jumper mounted.

1.2.7 mTouch™ Navigation Touch Pads (Left, Select and Right)
There are three navigation buttons. The Charge Time Measurement Unit (CTMU) module is a constant current source used to detect the change in the pad's capacitance. The buttons are covered in detail in 2.3 “Startup”.
A more detailed description of the CTMU module’s operation is provided in the “PIC24F Family Reference Manual”, “Charge Time Measurement Unit (CTMU)” (DS39724). Additional information on the mTouch™ system is available at www.microchip.com/mtouch

1.2.8 AA Battery Holder (BT2)
Two AA batteries power up the PWSB board.

1.2.9 Humidity Sensor (U3)
U3 is a humidity-sensitive (HR31) resistor made from organic macromolecules. This sensor can measure the humidity from 20% to 95% at temperatures between 0°C to 60°C.
The Humidity sensor is enabled only in Humidity screen.
Disclaimer:
In Humidity screen, the humidity sensor needs about a minute to stabilize.

1.2.10 Air Quality Sensor (U5)
U5 is an Air Quality sensor (MQ135) that is used for detecting NH3, NOx, alcohol, Benzene, smoke, CO2, etc.
It consists of a micro AL2O3 ceramic tube, Tin Dioxide (SnO2) sensitive layer, measuring electrode and heater, fixed into a crust made by plastic and stainless steel net. The heater provides necessary work conditions for work of sensitive components.
The resistance value of the sensor varies based on the gases detected and their concentration.
A specific alarm point or a relative message of pollution can be determined after considering the temperature and humidity influence.
Disclaimer:
1. To provide accurate readings, the AQ sensor requires 24 hours of continuous operation. However, this would cause a substantial battery drain. Hence, the demo program readings are for educational purposes only, and should not be used to qualitatively monitor/test the environmental air quality.
2. In Air Quality screen, the device will not enter in Sleep mode.
1.2.11  Boost Regulator (U2)

U2, Microchip's MCP16251 is a compact, high-efficiency, fixed frequency, synchronous step-up DC-DC converter.

This booster is used to power the heater coil of the Air Quality sensor. The booster gives a regulated 5V DC.

The Boost Regulator is turned ON only in the Air Quality screen.

For more information on MCP16251 Boost Regulator refer to data sheet (DS25173A)

www.microchip.com/MCP16251

| Note:       | Data from the sensors is for indication only. |
Chapter 2. Demonstration Application on PWSB

This chapter describes the preprogrammed demonstration on the PWSB while giving an introduction to the PWSB and an overview of its features. The topics covered are:

- **Startup**
- **Sections of the Demo**

### 2.3 STARTUP

On powerup, the LCD displays one of the following messages indicating the cause of reset:

- Device powered first time
- Deep Sleep wake-up without VBAT
- MCLR asserted
- Power recycled with VBAT intact
- Deep Sleep wake-up

This is followed by a time screen in 24-hour clock (**hh:mm:ss**) format. The three mTouch™ touch pads are used by the demo code for data entry and navigation:

- **Left Arrow (◄)**: Decrement the digit or go to the previous screen.
- **Select (●)**: Configure the time, date and/or set current digit.
- **Right Arrow (►)**: Increment the digit or go to the next screen.

The mTouch™ software included in the application waits a preset time to verify whether the pad has been touched. The application will not respond to a touch duration that lasts less than 500 ms, a touch longer than that is logged as one tap.

### 2.4 SECTIONS OF THE DEMO

The demo application is divided into several user interface sections, with each section utilizing a unique function of the microcontroller.

The sections are organized as a closed-loop menu, that is, the screens are navigated using ► and ◄ keys. The sections are ordered as follows:

- **Time**
- **Date**
- **Temperature**
- **Humidity**
- **Ambient Light**
- **Air Quality**

Some sections (e.g., configuring time) have sub-menus, which are selected using the (●) pad. Detailed information on these section follows.

Power Save modes: The two power-save modes implemented in this demo are:

- **Sleep Mode**
- **Deep Sleep Mode**

After setting the Time and Date, press ► to return to the Demo.
2.4.1 Time

The 24-hour time is the home page for the demo. This is a 24-hour time in \textbf{hh:mm:ss} format. The RTCC module is clocked using a 32 kHz on board crystal oscillator.

To set the clock:

1. Press \textbf{●} when the LCD is displaying the time.
2. The display shows, \textbf{hh:mm:ss}, where ‘hh’ is the current hour, ‘mm’ is the current minute and ‘ss’ is the current second. The first hours digit begins to blink, indicating that it is the current digit to be set.
3. Press the \textbf{◄} to decrement the hours digit or press \textbf{►} to increment the digit. Since this is a 24-hour setting, the digits cycle through 0 \rightarrow 1 \rightarrow 2 \rightarrow 0 \ldots.
4. When the correct digit is displayed, press \textbf{●} to save it. The current digit stops blinking and the next digit begins to blink.
5. Repeat Step 2 through Step 4 for each of the remaining digits until the display is showing the correct time.

\textbf{Note:} While setting the time, the PWSB does not allow returning to the previous digit. If there is an error while making the settings or after pressing \textbf{●}, the time setting process must be started all over again.

The time LCD display is available in Run mode and Sleep mode.

Once the Time is set and running, press \textbf{►} to go to the Date screen.

2.4.2 Date

Date is displayed in \textbf{mm:dd:yy} format in this section. To reset the date, follow the same procedure given for time setting.

\textbf{Note 1:} While setting the date, the PWSB does not allow returning to the previous digit. If there is an error while making the settings or after pressing \textbf{●}, the date setting process must be started all over again.

\textbf{2:} If the user sets an invalid date, it will be rejected. The date setting process will automatically start again from the first digit.

The Date LCD display is available in Run mode only.

Once the Date is set, press \textbf{►} to go to the next Demo screen.
2.4.3 Temperature

Microchip MCP9700 analog temperature sensor (U4) is used to measure the ambient temperature. This sensor converts the temperature to analog voltage which is measured by the microcontroller using Pipeline ADC.

The demo displays the current temperature in degree Celsius (°C).

The Temperature LCD display is available in Run mode only.

2.4.4 Humidity

HR31 humidity sensor is a humidity sensitive resistor made from organic macromolecules. It can be used in hospitals, storage rooms, workshops, production floors, restrooms, gardens, laboratories and more.

The humidity range varies from 20% to 95% for temperature 0°C to 60°C.

The Humidity LCD display is available in Run mode only.

2.4.5 Ambient Light

ALSPT19 ambient light sensor (Q2) is used to obtain the ambient light. This sensor consists of a phototransistor which converts light to relative current giving an analog voltage measured by the microcontroller using Pipeline ADC.

The demo displays the ambient light in the units of Lux.

The Ambient Light LCD display is available in Run mode only.
2.4.6 Air Quality

Air quality sensor, MQ135, measures the quality of air. MQ135 is sensitive to NH$_3$, NO$_x$, alcohol, Benzene, smoke, CO$_2$, etc. The sensor gives the concentration of these air pollutants which is displayed on the LCD as PPM of pollutant.

The Air Quality LCD display is available in Run mode only.

2.4.7 Sleep Mode

The PWSB enters Sleep mode when there is no activity on the board for more than 3 minutes. The PIC24FJ128GC010 device provides the ability to manage power consumption by selectively managing clocking to the CPU and the peripherals. For more information on Sleep mode, please refer to the device data sheet at:

www.microchip.com/PIC24FJ128GC010

On entering Sleep mode the LCD backlight is turned off and the display switches to Time screen, which shows time in hh:mm format.

In Sleep mode:
• RTCC is active.
• LCD is active.
• All other peripherals including mTouch buttons are inactive.

2.4.8 Deep Sleep Mode

The device enters into Deep Sleep mode when the wake-up (SW1) switch is asserted in Sleep mode. Deep Sleep mode consumes the lowest levels of power available from the instruction-based modes of the PIC24FJ128GC010 device.

Note 1: Before entering Deep Sleep mode, the LCD displays following message.

2: LCD screen goes blank in Deep Sleep mode.

On asserting the wake-up switch, the PWSB reverts to active mode by device reset, the Time screen is displayed by default.

In Deep Sleep mode:
• RTCC is ON.
• All other peripherals including LCD and mTouch buttons are OFF.
2.4.9 **VBAT Mode**

The device enters VBAT mode when the main power supply on VDD fails. The power supplied on VBAT only runs two systems: RTCC and Deep Sleep Semaphore Data registers (DSGPR0 and DSGPR1).

*Note:* LCD display is not available in VBAT mode.

To demonstrate the VBAT, remove the 'AA' jumper JP1 for 30 seconds. Replace the jumper, and a message 'Power Recycled with VBAT intact' will scroll across the screen. Notice that the displayed time is correct, as the RTCC is still running with the primary power (VDD) removed.

**TABLE 2-2: CURRENT CONSUMPTION IN DIFFERENT OPERATING MODES**

<table>
<thead>
<tr>
<th>Operating Mode</th>
<th>Current</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idle</td>
<td>2.2 mA</td>
<td>Peripherals are ON, Core is OFF.</td>
</tr>
<tr>
<td>Run</td>
<td>2.5 mA</td>
<td>Peripherals and Core are ON. LCD in Time screen.</td>
</tr>
<tr>
<td>Sleep</td>
<td>0.5 mA</td>
<td>Only LCD and RTCC peripherals are ON.</td>
</tr>
<tr>
<td>Deep Sleep</td>
<td>1.2 μA</td>
<td>Only RTCC and RAM registers are ON.</td>
</tr>
<tr>
<td>VBAT</td>
<td>800 nA</td>
<td>RTCC and Deep Sleep semaphore registers are ON.</td>
</tr>
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</table>

*Note:* All the readings are taken for 3.0V VDD and 8 MIPS.

2.4.10 **USB CDC Basic Demo**

To run the CDC demo, connect the PWSB board to a computer using a USB cable and launch a terminal program. When the switch SW1 is asserted, the device will echo the message "Button pressed." to the terminal window. When the user types a key in the terminal window, the device will increment the received value and echo the key resulting from the incremented value. For example, if the user types "a", the device will echo "b".

For more information on this demo refer to “CDC Basic Demo” of the “Microchip Libraries for Applications (MLA) – USB Library”.

For more information on this demo refer to “CDC Basic Demo” of the “Microchip Libraries for Applications (MLA) – USB Library”.
Chapter 3. Troubleshooting

This chapter discusses common operational issues and how to resolve them.

1. The demo application does not run.
The PWSB must be powered using two AA batteries. Ensure that the batteries are new and they are installed correctly. Also, ensure that the Jumper JP1 is mounted.

   **Note:** Rechargeable batteries are not recommended.

2. The Humidity sensor reading is not accurate.
The humidity of the environment varies from place to place. So the sensor shows different values when measured at different locations. Ensure that no moisture is collected on the humidity sensor.

3. The Air Quality sensor reading is not correct.
The Air Quality sensor needs 5V for its coil through on-board boost regulator. Ensure that the batteries are new.

4. The light sensor’s reading saturates under some bright light conditions.
The voltage generated by Q2 is set by resistor, R8. The default value is 30 kΩ, so it can measure a maximum brightness of 500 lux.

5. Device does not wake-up from deep sleep.
Ensure that the batteries are not dead or low on charge.
Appendix A. PWSB Schematics

FIGURE A-3: PORTABLE WEATHER STATION BOARD, SHEET 1 (PIC24FJ128GC010 MICROCONTROLLER)
FIGURE A-4: PORTABLE WEATHER STATION BOARD, SHEET 2 (OTHER ON-BOARD CIRCUITS)
<table>
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<th>Designator</th>
<th>Description</th>
<th>Manufacturer 1</th>
<th>Manufacturer Part Number 1</th>
<th>Supplier 1</th>
<th>Supplier Part Number 1</th>
</tr>
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<td>R1, R2, R3, R14</td>
<td>RES SMD 1K OHM 1% 1/10W 0603</td>
<td>Yageo</td>
<td>RC0603FR-071KL</td>
<td>Digi-Key</td>
<td>311-1.00KHRCT-ND</td>
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<td>VJ0603Y104KXXXCW1BC</td>
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<td>GLFR1608T4R7M-LR</td>
<td>Digi-Key</td>
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<td>BT1 (VBAT)</td>
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<td>Hirose Electric Co Ltd</td>
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Appendix B. LCD Panel Information

This section provides specific pinout of the LCD display panel. This information is especially useful for those who want to design custom applications using the PWSB.

The layout of the LCD Panel is shown in Figure B-5.
Table B-4 shows the mapping of the panel's pins to display segments and commons.

FIGURE B-5: LCD PANEL LAYOUT

DOTS 59*8
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<tr>
<th>LCD Pin</th>
<th>LCD Function</th>
<th>GC010 Pin</th>
<th>LCD Pin</th>
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## AMERICAS

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Fax: 678-957-1455

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Fax: 774-760-0088

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Fax: 630-285-0075

**Cleveland**  
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Fax: 216-447-0643

**Dallas**  
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Fax: 972-818-2924

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Tel: 248-848-4000

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Tel: 281-894-5983

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