Pressurized Spectra Implementation Notes

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General Implementation

The changes were implemented such that the software can be loaded on both pressurized and non-pressurized versions of the product with the pressurized features only being enabled/visible on units that have a sensor board installed.

Sensor Board

The sensor board provides the following readings: pressure, temperature and humidity. The Spectra software retrieves readings from the sensor board once every minute. After the readings are received they are compared with the alert threshold values to determine whether an alert condition exists.

Communication with the Sensor Board

The I2C protocol is used by the Spectra software to read data from the sensor board. In order to implement this, Spectra's I2C library needed to be modified to allow for a wider range of I2C addresses. Also the implementation of handshaking in the I2C read routine needed to be improved in order to communicate with the sensor board. This improvement was needed because the timing is different when reading from the sensor board from what it is when reading I2C memory.

The layout of the I2C communication area is as follows:

Address	**Use**
0x38000	Signature Byte #1 (0x53)
0x38001	Signature Byte #2 (0x42)
0x38002	Signature Byte #3 (0xAA)
0x38003	Signature Byte #4 (0x55)
0x38004	Sensor board major version
0x38005	Sensor board minor version
0x38006	Not used (was "sensor value multiplier" during development)
0x38007	Pressure reading MSB
0x38008	Pressure reading LSB
0x38009	Temperature reading MSB
0x3800A	Temperature reading LSB
0x3800B	Humidity reading MSB
0x3800C	Humidity reading LSB

The signature bytes have fixed values and are used by the software to determine whether the sensor board is present.

The pressure, temperature and humidity readings are "raw" values that need to be converted into standard units (C, PSIG, etc) before they are useful.

Menu Implementation

Added a function to the menu library that allows a character to be written in the column where the menu cursor is normally written. This function is used to display the up and down arrows that indicate whether a reading is over or under threshold.

See the document entitled “Pressurized Spectra Concept Addendum – Menu Additions and Changes” for specific information about added menus and menu items.

Dew Point Calculation

The dew point is calculated using the temperature and humidity readings. This calculation is done using integer math (including a logarithm function) in order to avoid the overhead associated with linking in the floating point libraries.

Alert Display

A 15 second display option was added to the label display subsystem in order to support the 15 second display requirement of the alert message. This option is only used internally and cannot be selected from the menus.

Data Logger

The data logger was implemented for debugging purposes. It is not part of official software release.

The data logger periodically logs sensor readings to e-squared memory on the main Spectra PC board. The memory that is used is the 64K that is normally used to store foreign language strings. This means that when foreign language strings are loaded, the data log is overwritten. Hard-coded presets are used to control the data log. When a set preset 86 command is received the contents of the log are output in a comma delimited format via the 422/485 port at 115200 baud. A set preset 85 command clears the log and causes a new entry to be immediately added.