Personnel Alert Product Description

Summary

The BW Personnel Alert (BWPA) is a low power wireless alarm notification system that transmits an alarm condition from one or more fixed base stations to personal, wearable "badges" within a hazardous area. The BWPA system utilizes the North American Industrial Scientific and Medical radio frequency band (ISM band: 902-928MHz). The system has a typical 100m-range and is rated for operation in temperatures from -20 C to +50° C.

Alarm conditions raised by a separate gas detection or PLC control system are sent to the BWPA base station via a Modbus (digital) interface or simple relay contact inputs. The BWPA system can be deployed with one or more base stations to provide a larger contiguous or "zoned" RF coverage area, and a system can track up to 256 portable badges. Each base station in a system maintains a table listing the unique ID numbers of badges currently registered with it, and during alarm conditions will keep track of alarm acknowledgements (or NACKs) from each actively registered badge.

The Base station has a backlit LCD display that displays the number of actively registered or "local" badges (badges within the base's communication range), up to 256, and the number of local badges in acknowledge mode, (up to 256) during an alarm condition.

Technical Detail

The Personnel Alert system uses the Xemics single chip transceiver operating in the North American 902-928MHz license-free ISM (Industrial, Scientific and Medical) frequency band, and is Frequency Hopping Spread Spectrum. (FHSS).   The transceiver transmits and receives data using half-duplex, NRZ frequency shift keying (FSK) data coding. The communication protocol is proprietary. Channel spacing (frequency separation) is set at 500 kHz, and uses 50 channels in the frequency band. The data channels have a bandwidth of 200 KHz.

The Base consists of two separate printed circuit boards:

- Radio
- Interface

The Interface PCB contains the LCD display and provides the I/O interface to the external controller or relays; the Radio PCB is the radio transceiver board. Two Microchip PIC18LF452 micro controllers are used on the Interface PCB in order to communicate between the MOSBUS and the Radio PCB. One micro controller is used on the Radio PCB to program the registers on and to control the data flow to and from the Xemics transceiver.

The Badge hardware has two PCB's, the RF deck and data processing circuitry are on the main PCB and the battery is on the second and is connected to the main PCB via a 4 pin header.

The Xemics radio operates in either of four states:

1. Receive
2. Transmitter
3. Standby
4. Sleep

In transmit mode, non-return to zero (NRZ) data is presented to the radio at the chosen baud rate of 19200 baud. The uP uses a CCP module and timer to generate the correct baud rate.

In receive mode the radio produces a logic-high at the "pattern output" pin if the configured reference pattern for the pattern recognition function is received. Alternating 0's and 1's precede the predetermined pattern. When the uP sees "pattern output" line go high, it samples the radio-received data with the radio's data clock output. The pattern and data clock are considered interrupt events at the uP.

RF Signal

The RF signal is 2 level NRZ FSK, Time Division Duplex (TDD) access, worst case duty cycle is 12%, binary information is being sent as 2 words at 19200 baud.