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MicroBadge Anti-Collision Reader

Theory of Operation

Description

MicroBadge Anti-Collision reader is a radio frequency identification device (RFID) operating at 125 kHz. The RFID system is composed of three basic components: reader (or interrogator); tag (or transponder) and host data processing system (generally a computer). The reader provides a communications link between the host computer and the transponder. The reader is connected to the computer via an RS-232 or RS-485 interface. The reader communicates with the tag via inductive coupling of loop antennas. A simple LC circuit provides power for the tag from the magnetic field generated by the interrogator. The tag modulates the LC circuit to transmit data back to the interrogating reader.

Intended Use

This type RFID system is often used to replace barcode systems, especially in applications where environmental conditions prevent reliable visual identification of the barcode. Because 125 kHz RFID systems do not rely on line-of-sight positioning, the readers can detect tag ID codes through water, dirt and all types of fabrics. An example application is garment identification in a commercial laundry. Another example is animal identification. Generally, the MicroBadge Anti-Collision reader is used in applications where necessary read ranges are less than one-half meter. The use of external antennas allows various in read ranges and additional flexibility for directional reading.

Operation

The MicroBadge Anti-Collision reader is used in conjunction with MicroBadge tags. The reader generates a 125 kHz carrier signal that provides enough energy to power the tag at short ranges, and this carrier signal also synchronizes the tag with the reader.

Once the tag has sufficient operating voltage, it will sequentially scan its internally stored code and inject either a 12.5 kHz (Logic 0), or a 15.625 kHz (logic 1) signal on a parallel resonant LC circuit. Since this circuit is within the magnetic field of the reader, the injected signals from the tag will appear as a varying load to the reader antenna (a coil).

The varying load presented to the reader is detected as an amplitude variation in the 125 kHz carrier; this variation is demodulated, and the 125 kHz signal is filtered out. The demodulated signal is then passed through a bandpass filter and a comparator to convert the 12.5 kHz and 15.625 kHz signals to logic levels.

The comparator output is fed to the microprocessor where the data is decoded and a CRC check is performed on the code. The reader generates an audible signal and a visual signal when a valid code is detected. Additionally, the valid digital code is transmitted to the RS232 or RS485 ports at 19.2Kbaud.

The antenna system~~s~~ consists of ~~a 1.623 +/- 5% millihenry~~ an inductor, the antenna coil, and a capacitor ~~or approximately 1000 picofarad~~ connected in series ~~with the inductor~~ to form a series resonant circuit at 125 kHz. The capacitance value is varied to provide maximum output voltage at 125 kHz. This variation

of the capacitance value is necessary to account for ~~cable and other~~ stray capacitance and/or inductance in the ~~reader~~ antenna system.