The device for which we are seeking certification under Part 15.249 is a transmitter only. Please refer to the Radiometrix spec, attached.

The RF Transmitter is part of a wireless bingo game system. Essentially the transmitter sends updated information to the individual players "handheld" bingo game (each time a ball is called out). The receiving device is in the handheld bingo game, which contains the 914.5 Mhz receiver. The receiver is the corresponding part of the RF system designed by Radiometrix. The model number of the receiver is RX3. Refer to attached Radiometrix spec.

The GameTech handheld game units are called the TED and TED^{2}C units. They are referred to in the GameTech Installation and Support Manual, which you should have received with the application package. They take the place of manual cards or booklets.

TED^{2}C

TED

Single Frequency RF System

Base Station Controller

Technical Description

Overview

The Base Station Controller (BSC) is a microprocessor controlled device which functions as the interface between a PC and the RF Transmitters (XMTR). A PC controls the BSC over an RS-232 link. The BSC in turn communicates with each of four XMTRs over a full duplex RS-485 link over a CAT-5 cable. The BSC also provides operating power to each XMTR over dedicated wires in the communications cable similar to a "Power Over Ethernet" application.

Power

Referring to the schematic, regulated 12 Volt DC power enters the board through J10 with ground as common. The 12 VDC is regulated down to +5 VDC by U11. 12 VDC is also routed to each of the XMTR jacks though resettable fuses F1-4 that supply power to each of the XMTRs.

RS-232 Interface

U3 is a MAX232 which, with surrounding passive components, provides a complete RS-232 to TTL interface for the board. The RS-232 signals are routed to J5 for interface to the PC. The RS-232 interface is a DCE configuration allowing the use of a "straight' RS-232 cable between the BSC and the PC. TTL data signals are routed to microprocessor U2 and 3-8 decoder, U5.

RS-485 Interface

The RS-485 interface to each of the XMTRs is provided by a MAX488 IC, U6-9 at J6-9, respectively. A MAX488 converts the transmit TTL signal levels to a differential RS-485 signal and receive differential RS-485 signal to TTL signal levels. Each differential receiver input pair has a resistor network to provide proper 120 ohm termination and open circuit level determination. R12, 7 and 11 provide this circuit on U6. LEDs, DS2-5, provide a visual indication of the presence of 12VDC power on each of the power carrying lines of the CAT-5 cable.

Microcontroller and Steering Logic

The microcontroller is a Microchip PIC16F873 (PIC). The clock for the PIC is provided by X2 a 14.7456 MHz crystal. The PIC is a FLASH device and can be in system programmed (ISP) through an on-board interface of J4. Received data in RS-232 format from the PC is converted to TTL by the RS-232 converter IC and the TTL signals are routed onto the internal UART input of the PIC. Transmit data from the PIC is uniquely routed to each of the RS-485 interface ICs or to the RS-232 IC by decoder IC, U5. This allows the PIC to communicate to each of the XMTRs or the PC individually. Acknowledgement feedback from each of the XMTRS is combined by IC U10A. This circuit is functionally a "wired OR" configuration. Since on and only one XMTR responds to the BSC at a time there is no confusion.

Single Frequency RF System

Base Station Controller

Technical Description

Operation

The intention of the system is to saturate the reception area with sufficient RF energy so ensure all receivers are contacted and their data is updated on a quick and periodic fashion. A predetermined set of command codes establishes the action of the BSC under PC control. The BSC receives commands and data from the controlling PC and relays the information to the XMTRs. The PC, through the BSC, directs each of the XMTRs to sequentially turn on its carrier, transmit the data and then turn off its carrier. The BSC can be directed to have the XMTRs perform the transmission once or continuously in a circular, sequential manner. Each XMTR transmits identical data only not at the same time in this circular, non-overlapping transmission sequence. The continuous sequential process continues repeatedly until the PC directs the BSC to stop.

Single Frequency RF System

Base Station Controller

Technical Description

Introduction

The Base Station Controller (BSC) is a microprocessor controlled device which functions to act as the interface between a PC and the RF Transmitters (XMTR). A PC controls the BSC over an RS-232 link. The BSC in turn communicates with each of four XMTRs over a full duplex RS-485 link (CAT-5). The BSC also provides operating power to each XMTR over dedicated wires in the communications cable similar to a "Power Over Ethernet" application.

Power

Regulated 12 Volt DC power enters the board through J10 with ground as common. The 12 VDC is regulated down to +5 VDC by U11. 12 VDC is also routed to each of the XMTR jacks though resettable fuses F1-4 supplying power to each of the XMTRs.

RS-232 Interface

U3 is a MAX232 which provides a complete RS-232 to TTL interface. The RS-232 signals are routed to J5 for interface to the PC. The RS-232 interface is a DCE configuration allowing the use of a "straight' RS-232 cable between the BSC and the PC. TTL data signals are routed to microprocessor U2 and 3-8 decoders U5.

RS-485 Interface

The RS-485 interface to each of the XMTRs is provided by four MAX488 ICs, U6-9 at J6-9, respectively. A MAX488 converts TTL signal levels to the differential RS-485 signals and vice versa. Each receiver input pair has a resistor network to provide proper termination and open circuit level determination. R12, 7 and 11 provide this circuit on U6. LEDs, DS2-5, provide a visual indication of the presence of 12VDC power on each of the four RS-485 lines.

Microcontroller and Steering Logic

The microcontroller is a Microchip PIC16F873 (PIC). The clock for the PIC is provided by X2 a 14.7456 MHz crystal. The PIC is a FLASH device and can be in system programmed (ISP) through an on-board interface of J4. Received data from the PC is routed to the internal UART input of the PIC. Transmit data form the PIC is uniquely routed to each of the RS-485 interface ICs or to the RS-232 IC by decoder IC, U5. This allows the PIC to communicate to each of the XMTRs or the PC individually. Acknowledgement feedback from each of the XMTRS is combined by IC U10A. This circuit is functionally a "wired OR" configuration. It is appropriate since on and only one XMTR responds to the BSC at a time.

Operation

A predetermined set of command codes establishes the action of the BSC under PC command. The BSC receives commands and data from the controlling PC and then when

directed by the PC, relays the information to the XMTRs. The BSC, still under PC command, directs each of the XMTRs to sequentially turn on its carrier, transmit the data and then turn off its carrier. Each XMTR transmits identical data only not at the same time in a non-overlapping sequence. The sequential process continues repeatedly until the PC directs the BSC to stop.

Single Frequency RF System

Product Description

The GameTech Single Frequency RF System consists of a PC, a Base Station Controller (BSC) and up to four RF Transmitters (XMTR). The XMTRs are located in strategic locations throughout a Bingo Hall. The XMTR's have a fixed radiation pattern and the XMTR locations are arranged within the hall so that a receiver located anywhere within the hall can receive the RF signal from at least two XMTRs. The PC controls the BSC and indirectly the XMTRs over an RS-232 link. The BSC communicates with each XMTR over a full duplex RS-485 link. Operating power is also provided to each XMTR by the BSC over the communications cable.

A predetermined set of command codes establishes the action of the BSC under PC command. The BSC receives commands and data from the controlling PC and then when directed by the PC, relays the information to the XMTRs. The BSC, still under PC command, directs each of the XMTRs to sequentially turn on its carrier, transmit the data and then turn off its carrier. Each XMTR transmits identical data only not at the same time in an non-overlapping sequence. The sequential process continues repeatedly until the PC directs the BSC to stop.

Single Frequency RF System

900 MHz Transmitter

Technical Description

Overview

The 900 MHz Transmitter (XMTR) is a microprocessor controlled device which functions to transmit data to the remote receivers. The BSC controls the XMTR over a full duplex RS-485 link on four pair, CAT-5 cable. The XMTR derives its operating power from dedicated wires in the communications cable similar to that of a "Power over Ethernet" application.

Power

Unregulated DC power enters the board through J3 with ground as common. The incoming DC is regulated down to +5 VDC by U2 and U3. U2 provides +5 VDC power to the microprocessor and RS-485 interface. U3 provides isolated +5 VDC to the RF TX module.

RS-485 Interface

The RS-485 interface is provided by a MAX488 IC, U4. The MAX488 converts the differential RS-485 signals to TTL signal levels and vice versa. The RS-485 receiver input pair has a 120 Ohm resistor to provide proper line termination. LED DS1 provides a visual indication of the presence of input power.

Microcontroller and Steering Logic

The microcontroller is a Microchip PIC16F873 (PIC). The clock for the PIC is provided by X2, a 14.7456 MHz crystal. The PIC is a FLASH device and can be in system programmed (ISP) through an on-board interface of J2. Received data from the BSC is routed to the internal UART input of the PIC from the RS-485 interface IC, U4. Transmit data from the PIC is routed either to the RS-485 interface IC or RF TX module by "OR gate", U5. This allows the PIC to output data to the RF TX module or the BSC individually. The data supplied to the RF TX module is encoded by the PIC as to ensure the data has a DC balance to facilitate proper transmission and carrier deviation. The PIC illuminates LED DS2 when the RF carrier is ON.

RF Transmitter Module

The RF Transmitter Module (RF TX module) is a self-contained FM transmitter. On the XMTR the module is powered by an isolated +5 VDC regulator but has its own internal voltage regulator. The RF carrier is turned on by applying a logical "1" on the EN pin of the module. The carrier frequency is factory set at 914.5 MHz. The value, accuracy and stability are determined by a SAW resonator that is internal to the module. There are no outside user adjustments of the center frequency. The carrier is frequency modulated in accordance with the logic level applied to the DATA pin of the module. The amount of frequency deviation is directly attributed by the value of R5.

Single Frequency RF System

900 MHz Transmitter

Technical Description

Operation

A predetermined set of command codes establishes the action of the XMTR under BSC command. The XMTR receives commands and data from the BSC. The BSC then directs the XMTR to turn on its carrier, transmit the data and then turn off its carrier. When the transmission is complete the XMTR sends an acknowledgement signal back to the BSC via the RS-485 link.