Ccure Watch RF Product Description

The CcureWatch product is an access control and asset management system utilizing Texas Instrument's TIRIS® RFID technology. The system embodies the process of identifying TIRIS badges and tags that are within a 3-foot radius of a transceiver antenna. The CCure Watch equipment includes a Reader Box with built in OEM power supply, two antenna types with built in transceiver board, and Hardware for mounting the antenna. Cables, which run from the Reader to each antenna, are to be supplied by the installer. The antenna is mounted on either side of a secured entrance/exit. Depending on the level of performance, 3 or 6-foot openings will require one, two or four antenna configurations. Additional cabling is required for synchronization, communications to an Access control panel and RF grounding.

Reader box

The reader box is a wall mounted electronics box. AC power is provided via metallic conduit to the mains input located at the bottom of the box. Alternatively, systems requiring non-metallic conduit includes a strain relief and a separate RF ground wire. The RF ground wire must be less than 6 feet long, 12 gauge in diameter and connected to the building ground. The reader has been tested to UL294 and as such can be mounted in Plenum space when electrical codes permit. The functions of the reader box are to:

1. Provide an interface to the Access control panel via RS485
2. Provide the electronic decoding of the TIRIS tag or badge signals that transverse the secured opening
3. Provide a means for system configuration for up to four antennas
4. Provide power, synchronization and control for the attached antennas

The transmit signal originates from the reader and is conveyed to the antenna through the control cable. The receive signal is a differential analog signal that is brought from the antenna to the reader through the control cable as well. Each antenna has three status LED's that are controlled by the reader and has separate control signals within the control cable. This cable is a shielded eight-conductor minimum 22 AWG twisted pair bundle. The shield is terminated at the reader only. A two conductor 16 AWG cable from the Reader box provides power to the antenna. The maximum length of either cable is 150 feet.

The reader provides communications to the access control panel via RS485. This cable is a shielded 22 AWG twisted pair. The shield is terminated at the Reader and the access control panel and may be as long as 1000 feet. When communicating with the access control panel, the reader uses a standard Sensormatic RM READER protocol. Depending on the on-board rotary switch settings, the reader may be seen (by the access control panel) as one, two, three or four different RM READERS.

To eliminate reader receiver interference, a synchronization of all readers is provided through the RS422 port in a master slave daisy chain arrangement.

Finally, the reader provides two controlled 12-volt outputs and two auxiliary supervised inputs. All are monitored and controlled by the access panel via the RM protocol.

Antenna (transceiver)

There are two types of antennas, type A and type B. Both antennas are loop antennas, have two sections, top and bottom and provide an aperture size of 29.8 cm^2. The A type antenna is wound in such a way as to provide a stronger field in the top section for main badge orientations. The B-type antenna may be thought of as an A-type turned upside down and consequently provides a stronger field in the bottom section of the Antenna. The antenna can be mounted on a wall or doorpost using mounting hardware and brackets provided by the factory. The antenna includes a transceiver PCB (RFI board) that provides drive to the series resonant circuit. Tuning the antenna is accomplished by a set of capacitors that are activated by jumpers provided by the factory.

Standard Operations

A typical access control system begins with the microprocessor turning on the transmitter for 50 milliseconds. A badge, which is within the systems specified range, is charged up and awaits the transmitter to turn off. During the transmit phase, the following processes are occurring:

- DSP is executing through external system memory at 40 MIPS
- The μP is executing through on chip flash memory
- Serial data is transferred from the DSP to the μP
- The CPLD divides down the 40MHz clock to 134.2KHz (Transmit signal)
- The RF transmit signal (134.2KHz) is conveyed to two of the four RF transmitter driver boards (RFI)
- The RFI buffers the transmit signal and drives the 60 watt antenna using a half bridge driver circuit
- The 60 watts needed to drive the antenna is provided by an OEM 15V 130-watt resonant mode switching power supply. This voltage is stepped up to 16 volts before power is separately cabled to the RFI.
- To prevent interference, all readers within a specified distance are synchronized by the μP through the RS422 port. This port produces a 50 millisecond pulses by the master Reader and sent to all slave Readers which will align their transmit periods with the master's pulse.

After 50 milliseconds, the system enters the receive mode which is initiated by the μP turning off the transmit signal. During the Receive mode the following processes are occurring:

- The badge or tag detects the end of the transmit mode and sends it's FSK data
- The RFI receives this signal, buffers it and sends the signal differentially to the Reader board.
- The Reader analog section amplifies and demodulates the signal removing the mixer components as well as attenuating out of band noise prior to digitizing by the ADC.
- The ADC samples the data at 106KHz and serially sends the data to the DSP. At the same time, the daughter card performs the same task on a separate signal from another antenna. Allowing for two antenna receptions per transmit and receive cycle.
- The ADC runs from a 6.8MHz clock.
- The DSP buffers the data from both the Reader ADC and the Daughter card and waits until the transmit mode before processing the data.

If a frame of data is found to have a correct CRC, the DSP serially sends the data to the μP who then sends the information via RS485 to the access control panel. The person or asset is then identified by a predetermined database and access is granted or denied by the access control panel.