An expository statement about Central Monitoring System (CRT-CMS03)

Part 1. General

These devices are intended for use inside buildings, particularly inside manufacturing facilities, research laboratories to monitor temperature of various refrigerators and incubators. Depending on user selection, one receiver may monitor as many as 30 transmitters at the same time.

1.1. Working requirement for the system:

- Receiver will be sit on top of a PC and connected through cable to a ComPort of a PC;
- Transmitter measures the temperature of a lab/house-hold refrigerator or the like and sends through a RF module to the receiver. Distance between transmitters and receiver may range from 20 to 150 ft. In working conditions, as many as 30 transmitters may transmit their readings to the receiver at a random transmission fashion. The proposed protocol for such transmission is: Every transmitter will make one transmission in about 10 minutes. Since the system will be used inside various buildings of different rooms, we'd like the system have good immunity against roof and walls.
- Transmitter will be placed on top a refrigerator. It will collect data such as temperature and send to the receiver every 10 min. or so.
- In normal working conditions, both transmitter and receiver are powered by 9 VDC adapters (powered from wall outlet at 110 V ac). Battery will be used in case of power failure.

1.2. Description of known technical information

A. Transmitter/receiver frequency:	418	MHz
B. Data rate in RF transmission:	2400	K bps
C. Data rate:	1	every 10 min.
D. Data string length:	about 240 mSec.	
E. Duty cycle:	7-12%	
F. Power: Normal	9 V	DC adapter, UL approved, class B certified
Backup	9 V	rechargable battery for transmitter
	7.2 V	rechargable battery for receiver
G. Transmitter will require	part-15 Certified	
H. Receiver will require	part-15 Verified	
I. Both certified/verified	Part-15. sec. 231	
J. Size:	3.5 " (H) X 5" (L) X 1.5" (D)	for transmitter
	1.5 " (H) X 7" (L) X 5" (D)	for receiver

Part 2. Receiver

The receiver is connected to a personal computer (PC) through a standard RS-232 cable. This PC is intended to collect data continuously from the receiver. Another function of the receiver is to store received data into its memory in case of power failure, which causes PC incapable to collect data from the receiver. The rechargeable batteries in the receiver and transmitter will permit the transmitter and receiver continuously to work for at least 24 additional hours after power failure.

Power supply:

Normal situation:	9 Vdc power adapter using 110 V AC power from regular wall outlet. Power consumption is about 40 mA.
Battery backup:	7.2 V rechargeable battery. To be used in case of power failure.

Displays:
This receiver is controlled by a main switch. It will not work if the switch is in OFF position. Please plug in the AC adapter and then switch to "ON". The five LEDs indicate one of the following events:

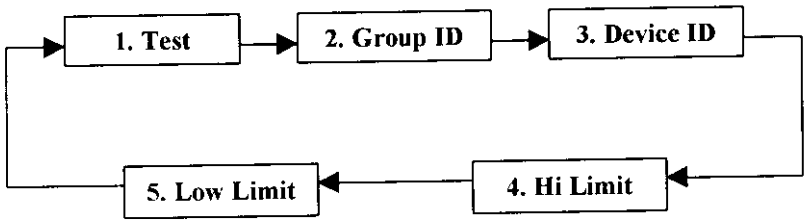
1. GREEN: ON/OFF. AC power indicator. ON: there is AC power; OFF: no AC power
2. GREEN: OFF/FLASHING. Indicate if the receiver is working. FLASHING-working
3. RED: OFF/FLASHING. Indicate if PC requesting data. FLASHING-PC is requesting data
4. RED: ON/OFF. ON – Indicate there is data in its memory
5. RED: ON/OFF. ON – Indicate bad communication with PC. OFF – Normal

Part 3. Transmitter

The transmitter sends out a data string through its RF module. The data string includes the measured value, such as temperature, the status of a switch (open or close), and its working status. This data is transmitted out periodically at a rate of one transmission every 5-10 minutes. Detail characteristics are discussed below for reference:

Body of the device: assembled inside a ABS plastic box, which contains all necessary electronics and the fixed interior antenna. There are three buttons and one switch on the case.

Buttons (in normal working situation):
Mode: Select mode which is one of the following actions.



1. Test: in this mode user press either "UP" or "DN" key, the transmitter will send a test string to the receiver.
2. Group ID: To setup the identification code for a group of Devices. All transmitter and receivers in the same group MUST have the same Group ID. Code ranges from 01 to 99.
3. Device ID: To setup the identification code for the Device. This code is unique to identify the device. Code ranges from 01 to 99.
4. Hi Limit: To setup the high temperature alarm value, in °C. When temperature crossed this value, a special report string is send to receiver.
5. Low Limit: To setup the Low temperature alarm value, in °C. When temperature crossed this value, a special report string is send to receiver.

UP & DN: Used in combination with MODE to adjust the codes.

Probes:
External Probe: It is a temperature sensor, ranging from –20 to 50 °C.
External switch: Can be used for any purpose such as the status of the open or close of an incubator

Displays:
The bigger LCD display: Displays current temperature value in 0.1 °C resolution. Accuracy: ±1 °C.
The smaller LED display: Used to facilitate the setups.

Power supply:

Normal situation:	9 Vdc power adapter using 110 V AC power from regular wall outlet. Power consumption is about 20 mA.
Battery backup:	9 V rechargeable battery. To be used in case of power failure.

Power switch: Located on top of the device which controls the main power of the Device