DETECTION SYSTEMS, INC.
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Technical Description of SE88 Transmitter Family

SE88 transmitter family includes the models of **SE88-60M-304, SE88-30S-304** and **SE88-10S-304.** They are battery operated, Watchtype two button RF transmitters with carrier frequency of **304.0MHz**. They are designed with supervisory, low battery detection and waterproof capabilities. All the models have same RF transmitter portion and the only difference among them is the supervisory time of which **SE88-60M-304** is 65 minutes, **SE88-30S-304** is 32 seconds and **SE88-30S-304** is 11 seconds. These products can be used to send "alarm", "test" and "auto-tracking" command signals to receiver(s) in DS Escort Security System.

Frequency Control Devices Used:

1. An internal 4MHz RC oscillator as microcontroller's clock.
2. One **304 MHz** SAW resonator used for the oscillator of the RF transmitter.

The transmitters send multiple RF data bursts as the following:

- 4 packet "test" signal transmitted and LED blinks by pressing "test" button.
- 8 packet panic signal and LED blinks whenever "alarm" button is pressed.
- 2 packet "auto-tracking" signal transmitted every 7 seconds for total of 15 minutes after an "alarm" transmission has been generated.

Special Software Function for Agency Tests and Its Operation:
A special software is designed for the convenience of agency tests of **SE88** transmitter. Whenever you press "alarm" button of a testing unit the RF transmitter will transmit about 5 minute RF signal and then stop. Repeating above action activates another 5 minute transmission. The RF data and packet format of the testing transmitter is same as those of production units except that the testing unit repeats the packets for ease of testing. Pushing the test button will terminate the transmission. **Please replace the batteries after two hour testing because the special software function consumes more current.**

Duty cycle correction factor calculation:

Each packet contains 76 data bits and the packet transmission time with 5KHz data rate is 15.2 ms. Our **50% duty cycle Manchester coding** of the transmission ensures a **50% ON-AIR time** for every packet which is 7.6 ms. The minimum quiet time between packets is 100 ms.

Packet time = 15.2 milliseconds.
Quiet time between packets = 100 milliseconds.
ON-AIR time = (Packet time)×50% = 7.6 milliseconds, in 115.2 milliseconds.
Factor = 20 LOG(ON-AIR time/100ms) = 20 LOG(0.076) = **-22.38 dB**

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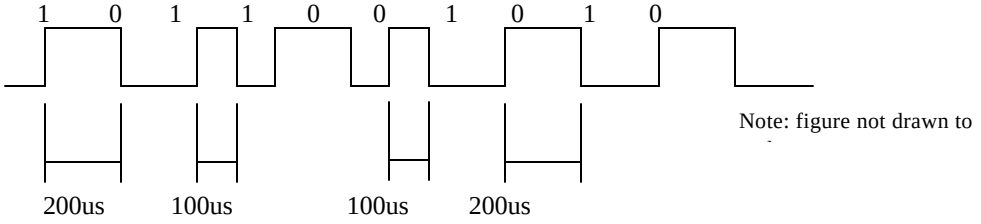
General RF Alarm Devices Information for 5kbps

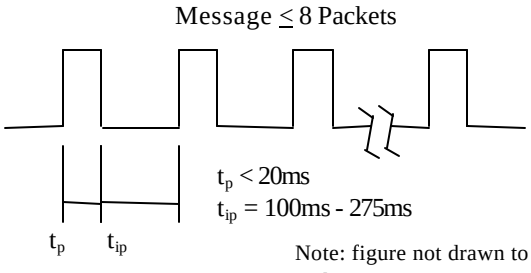
1. Data Modulation

The data is modulated using the Manchester on/off keyed encoding scheme with 50% duty cycle shown below. The on-air format is defined with a '1' bit which is carrier turning on at the bit center and a '0' bit which is carrier turning off at the bit center.



2. Message, Packet and Inter-Packet

A packet consists of all on-air bits that are transmitted to provide the system with the current status of a transmitter. A single message is composed of up to 8 packets of the same data. The time between packets is defined as a pseudo-random time length between 100 milliseconds and 275 milliseconds.



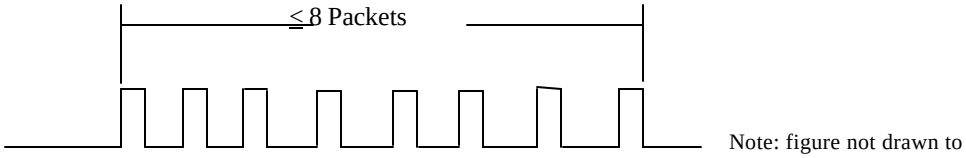
Note:
Packet width of ≤ 20ms with 50% duty cycle Manchester modulation makes the on-air time ≤ 10ms. Therefore, no transmission has more than 10ms of on time out of 100ms.

3. Transmission

A message will be transmitted when a control signal has changed, a system integrity test takes place or the supervisory time has expired.

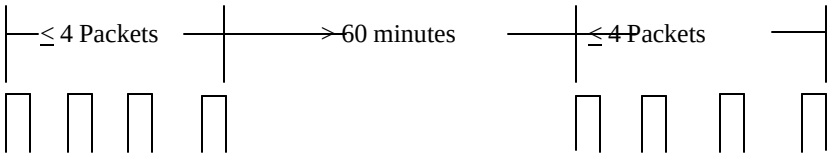
Control Signal / Recognition Code

A single message, of up to 8 packets, will be transmitted when the control signal changes in a transmitter or a repeater. Up to 8 packets of recognition code will also be transmitted by the repeaters to ensure system integrity.



Supervisory

To verify system integrity, the state of the inputs will be transmitted periodically. These transmissions consist of not more than 4 packets and will occur not less than every 60 minutes.



Note: figure not drawn to