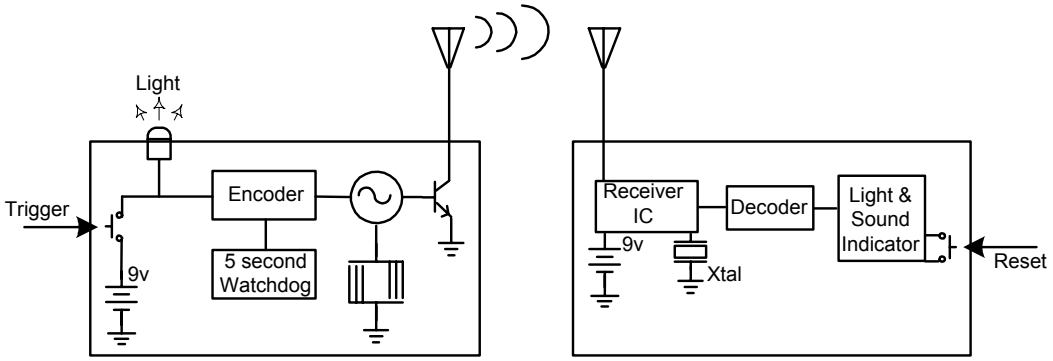
L.S. Research Inc.
W66 N220 Commerce Court
Cedarburg, WI 53012
Phone 414.375.4400
Fax 414.375.4248

1.0 Theory of Operation

This section presents the design approach.

The design was chosen to comply with the FCC part 15, unlicensed operation at 433.92 MHz. The transmitter is an AM/ASK transmitter, with a SAW based oscillator. An encoder and decoder set the communication parameters between the transmitter and receiver. The receiver utilizes a hybrid superheterodyne receiver IC chip. The receiver IC uses a 13.225 MHz crystal oscillator as a stable frequency reference, with an intermediate frequency of 10.7 MHz. The block diagram of the RF system is presented below:



Transmitter Block Diagram

Receiver Block Diagram

In normal operation, the transmitter is not powered on. The trigger mechanism, when actuated, turns on the power to the transmitter. As the transmitter is triggered, it begins transmission of the coded packets. The receiver, carried by the user, then activates the light and sound indicators, in a latched fashion. The user, at this point, deactivates the transmitter, which will shut off within 25 milliseconds of deactivation by the user. The transmitter also has a watchdog timer that will time-out before 5 seconds, and stop transmission via the transmit-enable pin. This limits the total transmission to less than the allowed 5 seconds. The receiver will continuously run the light and sound alarm indicators to alert the user. The light and sound indicators on the receiver can only be reset after the transmitter is deactivated. After the transmitter is deactivated, the receiver can be restored into normal operation with the alarm reset switch. Multiple transmitters may be used with one receiver. Each transmitter has an on-board light indicator, that can easily identify which of the transmitters have been activated in the multi-transmitter setting. The user, ice fishermen, would typically be in close proximity, within 300 feet of the activated transmitter, and can quickly attend to the transmitter. The environment of use would typically be on a frozen lake.