7213206 -Transmitter Operational Description

The transmitter is used to send signals to a remote receiver that indicates the operating status of a water softener conditioning system. This allows a person to know if the water softener is operating properly, or needs attention, without having to be physically present at the unit itself. Many times the water conditioning equipment is not in a convenient location. Three different commands can be sent from the transmitter to the receiver to indicate the water softener status. They are: system OK, low salt, and check system. The transmitter sends one of these commands every minute.

The transmitter is connected to the water softener main printed wiring assembly (PWA) with a five pin connector. The five lines are Sense, +5VDC, TX, TX Enable and Ground. The transmitter is powered by 5 VDC from the softener circuit PWA. With the TX enable line set to logic zero, the 418MHZ oscillator is turned off and the only power draw is the leakage across the transistors Q3 and Q1 and the PC board. Transistor Q2 is not populated on the transmitter.

The active circuits consist of a 418 MHz oscillator, an OFK modulator, and an amplifier. The TX, and TX Enable lines are driven by the water softener PWA which contains a microprocessor running at an oscillator speed of 8 MHz to control the necessary timing requirements.

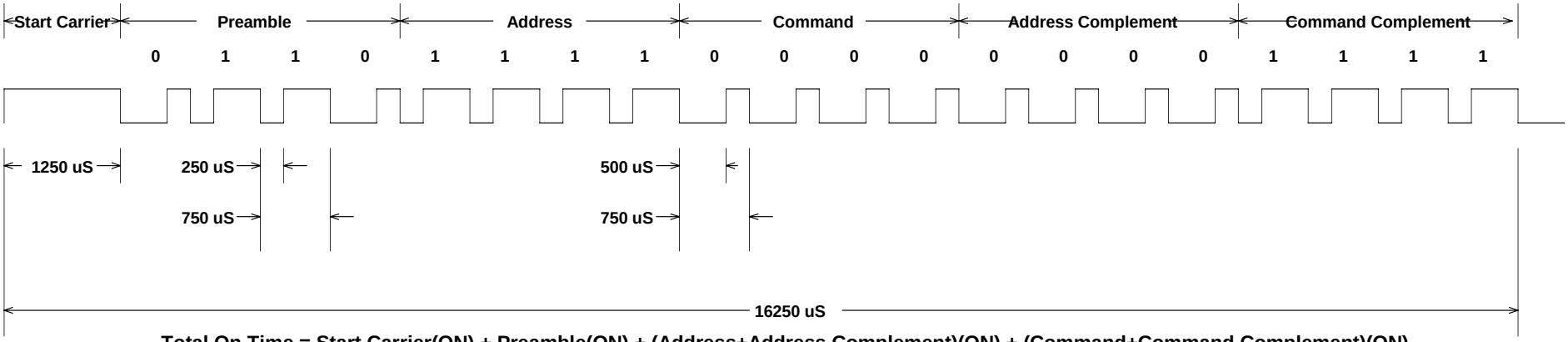
The command protocol consists of a pulse width OFK modulated signal. This has a start period of 1250 microseconds to allow the receiver to enable. This is followed by a preamble of zero, one, one, zero. After this 16 bits of information are sent consisting of address, data, and a complement of address and data. The worst case time the command is transmitted is 8.25 milliseconds. A bit time is 750 microseconds, with a zero being 500 microseconds off and 250 on and a one the opposite, with 250 microseconds off and 500 microseconds on. This command is repeated every 60 seconds, which gives it an on time of 8.25 milliseconds every 100 milliseconds (8.25%). For a further description see next page.

The microprocessor on the water softener PWA, outputs two signals. The first enables the 418 MHz oscillator, and the second sends the command to the modulator. The oscillator is a one transistor SAW oscillator that runs at 418 MHz. This is the fundamental frequency with no multiplication's of frequency used. When the microprocessor enables the oscillator it runs constantly.

The oscillator is then fed to an amplifier and a modulator. The modulator consists of a NPN transistor that is turned on or off. When it is on, it shunts the oscillator signal to ground and when off allows the oscillator signal to drive the amplifier. The amplifier consists of another NPN transistor and drives a passive matching circuit.

The matching circuit filters the harmonics and matches the impedance of interconnected traces on the printed circuit board that acts as the antenna.

Transmission Data Timing



Total On Time = Start Carrier(ON) + Preamble(ON) + (Address+Address Complement)(ON) + (Command+Command Complement)(ON)

= 1250 uS + 1000 uS + 3000 uS + 3000 uS

= 8250 uS

Total Off Time = Preamble(OFF) + (Address+Address Complement)(OFF) + (Command+Command Complement)(OFF)

= 1000 uS + 3000 uS + 3000 uS

= 7000 uS

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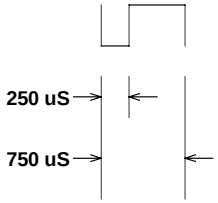

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