Operational Description

WeatherTRAK Circuit Operation

The WeatherTRAK Irrigation Controller consists of two basic subsystems:

1. A microController-based sprinkler timer of conventional design.
2. A radio receiver optimized to receive Paging signals in the 928-932MHz band.

The basic operating frequency of the microController is 10.240 MHz; radiation of this signal and its harmonics are very low because all of the high frequency signals are on-chip with very short radiating conductors.

The radio receiver is a conventional triple-conversion superheterodyne circuit. A quarter-wave monopole antenna is fed through a highly selective SAW filter to a preamplifier with a gain of about 15dB. The signal is then block downconverted to a 70MHz IF by a 1 GHz local oscillator and an active mixer (highside injection). The 1 GHz LO and the preamp/mixer chain is shielded by fully enclosing metal cans. The LO to RF leakage from the first mixer is suppressed by the input SAW filter.

The 70 MHz signal is then bandpass filtered and further downconverted to 10.7MHz by a frequency agile local oscillator working between 78.7MHz and 82.6MHz, which performs the channel selection function.

After filtering at 10.7MHz, the signal is downconverted again to a 455KHz IF by means of a 10.245MHz local oscillator and mixer. The 455 KHz is limited and processed through a data slicer and then digitally demodulated by a custom Motorola decoder chip.

When an incoming message is detected, the microcontroller retrieves the message from the decoder chip and uses the data payload to influence the irrigation schedule in the sprinkler timer.