THEORY OF OPERATION
Wireless Microphone

General:
The Colorado Time Systems (CTS) Wireless microphone is a wireless alternative to the wired microphone used with the Championship Start System. The start system is a unit which provides a start signal, in the form of an audio tone, a strobe flash, an led light bar flash for racing swimmers and a signal to a timing computer to indicate when a swim race has begun. The unit also acts as a PA system to allow the Start Judge to prepare the swimmers for the start of a race. The Championship Start System can operate simultaneously with a both types of microphones.

Wireless Transmitter:
The wireless microphone uses a Linx TXM-HP3 transmitter module operating in the 902-928 MHz band. The TXM-HP3 is a high-performance, multi-channel RF transmitter capable of transmitting analog or digital data. Digital information is modulated at the transmitter using FSK (frequency shift keying), the binary form of frequency modulation. To transmit analog the module reverts to FM modulation.

A precision 12.00MHZ Voltage-Controlled Crystal Oscillator (VCXO) serves as the frequency reference for the transmitter. Incoming signals are filtered to limit their bandwidth and then sued to directly modulate this reference.

The modulated 12.00MHz reference frequency is applied to the Phase –Locked Loop (PLL). The PLL, combined with a 902-928MHz VCO, forms a stable frequency synthesizer that can be programmed to oscillate at the desired transmit frequency. An on-board micro-controller manages the PLL programming functions. The CTS wireless microphone, uses a BCD encoded rotary switch to allow the user to select 1 of 8 available frequencies.

The PLL locked carrier is amplified and buffered to isolate the VCO from the antenna and to increase the output power of the transmitter. The output of the buffer amplifier is connected to a filter network, which suppresses harmonic emissions. The signal then reaches the single-ended antenna port, which is matched to 50 ohms.

The CTS wireless microphone transmitter uses an internal surface mount grounded line planar antenna (Linx ANT-900-SP).

Power to the transmitter is supplied by a 9V battery that is regulated to 5VDC.