REVISION RECORD			
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TITLE: MMCT OPERATIONAL/ TECHNICAL DESCRIPTION

INTRODUCTION

Qual-Tron, Inc. of Tulsa Oklahoma manufactures a full range of unattended ground sensors and monitoring systems used to detect intrusion activity. The mechanical and electrical sensors include Breakwire, Magnetic, Seismic, IR Break Beam, Passive IR Sensors and Hydrophones. These sensors are used in combination with the MIDS single channel system, MIDS-II (modified) single channel system and EMIDS Multi-channel system. These systems utilize transmitters, relays and receivers to provide digitally encoded messages of alarm activity. Qual-Tron also manufactures base station equipment, power supplies and auxiliary equipment to provide a complete functional system.

PURPOSE

The purpose of this document is to provide a brief description of the circuit functions of the MMCT EMIDS Multi-Channel Transmitter along with a statement describing how the MMCT operates. A description of the ground system and antenna is also discussed.

MMCT OPERATIONS

The MMCT is an EMIDS multi-channel synthesized transmitter. It is capable of transmitting 999 separate ID codes. During normal operation, the transmitter is triggered by an external sensor. The transmitter has built-in features to allow alignment of the PIR – Passive Infrared Sensor and MBBD – IR Break Beam Sensor. Once batteries are installed, built-in switches determine alignment and operational mode. When triggered by a sensor, the MMCT transmits a 29-bit digitally encoded packet. The packet includes a three digit ID code, a 4-bit message type, direction, fault, tamper, test, and low battery indicator. A SOH – State Of Health is also available with the transmitter at 1, 2, 6, 12, and 24 hour intervals. A fault message is automatically transmitted for any sensor disconnect. The MMCT is compatible with all Qual-Tron sensors.

CIRCUIT FUNCTIONS

BLOCK 1: The transmitter is triggered by a momentary positive pulse, typically 5 VDC from the sensor. This trigger sets a flag which wakes up the microprocessor. The microprocessor enables the transmitter and generates a 1200 baud Manchester code that includes 8 bits of preamble, a start

bit, a message type, a selectable ID code, status information and an odd parity bit. This encoded message is used to modulate an FSK transmitter. The modulation input into the FSK modulator is used for deviation of the carrier frequency +/- 3 KHz. The microprocessor also programs (controls) the frequency dividers within the PLL to set the desired carrier frequency.

BLOCK 2: The fundamental frequency of the transmitter is derived by a TCVCXO crystal, a Colpitts temperature compensated circuit with a stability of 2.5 PPM over the operating temperature range. The 12.8 MHz output of the TCVCXO drives the single-chip synthesizer PLL. The PLL uses the TCVCXO output to establish a reference frequency for the phase/frequency detection circuit, for channel spacing and to develop the voltage necessary to drive the VCO. The VCO operates at the microprocessor selected output carrier frequency in the range of 138 MHz to 154 MHz and is controlled by applying a voltage to a Tuning Diode. The PLL compares the VCO frequency divided by the dual-modulus divider and internal dividers to the reference frequency and outputs a series of correcting pulses to the low-pass filter to correct the VCO frequency.

The data out from the microprocessor is used to modulate the low pass filter and amplifier. This results in a deviation to the carrier frequency by +/- 3 KHz. The low frequency component of the modulating signal is also used to modulate the TCVCXO for improved DC response.

BLOCK 3: The modulated output signal from the VCO is then fed into the RF Power Amp, which is set for 1 watt output. The antenna is a simple wire whip stub antenna screwed into the enclosure.

MODULATION SYSTEM DESCRIPTION

The modulation of this system employs Frequency Shift Keying at 1200 Baud. The transmission of data is typically event driven in short-bursts of 25 ms or less. The modulation uses a 29-bit Manchester code that includes 8-bits of preamble, a start bit, 4-bit message type, 10-bits of ID, 5-bits of status and a parity bit.