



TECHNICAL DESCRIPTION

ECO-Lite Controller

Doc No 970-000013-000

Revision 0.00

May 2, 2000

<u>REVISION</u>	<u>DATE</u>	<u>CHANGED BY</u>	<u>DESCRIPTION</u>
0.00	02/05/00	B. BARLOW	ORIGINAL

1 PURPOSE

This document sets forth the technical details of the ECO-Lite Controller for the expressed purpose of regulatory evaluation. Some details are considered proprietary and confidential; therefore, reproduction or transmission of any part or in whole and in any form without consent of EXI Wireless Systems Inc. is expressly prohibited.

2 THEORY OF OPERATION

The primary function of the ECO-Lite Controller is to generate audible and visual alarms when a TAG is identified (patient or asset) within a 'field' of protection. The Controller communicates with and identifies the TAG by means of a proprietary wireless protocol. A local field is generated by the controller at the frequency of 307 kHz, and a TAG in the field responds at 433.92 MHz. The 'tag in field' (TIF) identification is accomplished in a full duplex burst of code. After identification, the tag will not respond to the low frequency field for at least 10 seconds.

The Controller will also receive 'reset' and 'bypass' commands at 433.92 MHz from the EXI Wireless Keypad product. This is a one way (incoming) message from the keypad, initiated by an operator. Multiple keypads can be supported, with individual keypads identified for security. The protocol allows each keypad to individually log on to the controller.

The Controller is powered at 24VDC. A 9 volt NiCad battery provides a back up supply to the system controller IC during external power supply interruptions. There are no externally accessible antennas. During external power failure, the low frequency field transmitter is turned off, and audible and visual alarms are generated.

2.1 307 kHz TRANSMITTER

The modulation type is pulse-width encoded OOK. The 307 kHz signal is generated from a 2.4576 MHz crystal oscillator and pulse width gated (modulated) by the internal processor. The transmission has three different bursts of code occurring at, nominally, 93 msec intervals. With no tag in the field a wake-up burst of nine pulses with an average duty cycle of 0.215 is transmitted in alternation with a thirteen pulse wake-up and respond code stream having the same average duty cycle. A responding tag is identified in a full duplex data exchange of 31 pulses. This follows the last wake-up and respond message for a total code stream of 48 pulses at a nominal duty cycle of 0.22. The modulated 307 kHz signal is amplified and drives an internal ferrite core antenna to produce the pulsed field of protection. The amplifier is designed to limit the transmission power to conform to FCC Part 15, Subpart B, Class B emission levels. There is no user adjustment procedure.

2.2 433.92 MHz RECEIVER

The receiver is a single RFIC, of the tuned RF type, with 500 kHz of bandwidth. The signal is AM detected and sliced via an onboard comparator. The threshold level is factory adjusted to provide good immunity to AM 'in-band' interference. A printed 433.92 MHz antenna is included on the PCB assembly.

2.3 PROCESSOR and I/O

An 8-bit microprocessor, running at 20 MHz from a fundamental crystal oscillator, pulse modulates the 307 kHz transmit signal and decodes the received data stream. The processor generates alarm code signals, which drive a tone generator and three LED indicators. A relay provides an isolated set of NO and NC contacts for use with external sensors. A DC input power jack is provided for 24 VDC supply. The average dc current drain is 120 ma with peak surges to 180 ma.

3 DATA WAVEFORMS

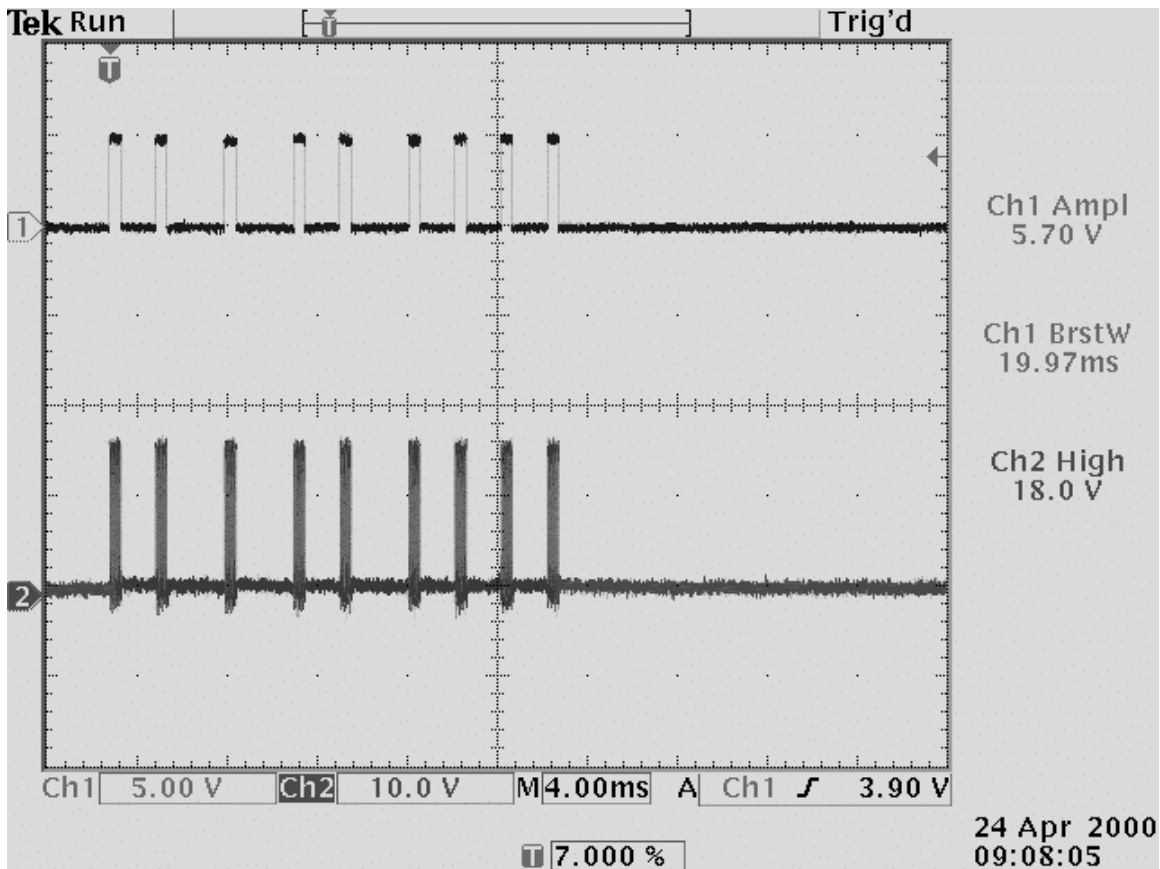


FIG 3.1: Trace 1, TX Data Modulation Signal (Wake Up Code)
Trace 2, 307kHz Modulated Signal at the Antenna Input
Duty cycle = $.5 \times 9 / 20 = .225$

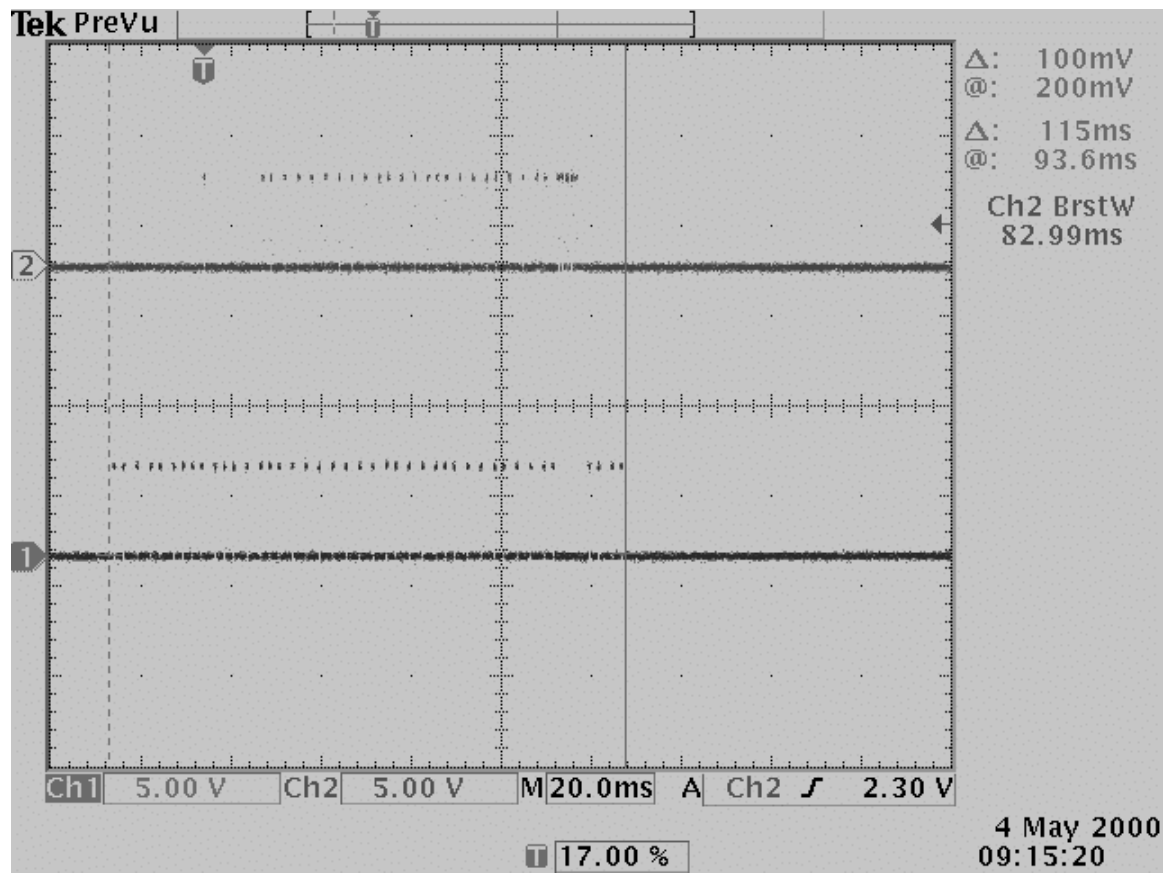


FIG 3.2 Upper Trace (3): Decoded 433.92 MHz Tag ID Response Data Stream
Lower Trace (4): TX Wake UP, Respond & Interrogate Data Stream

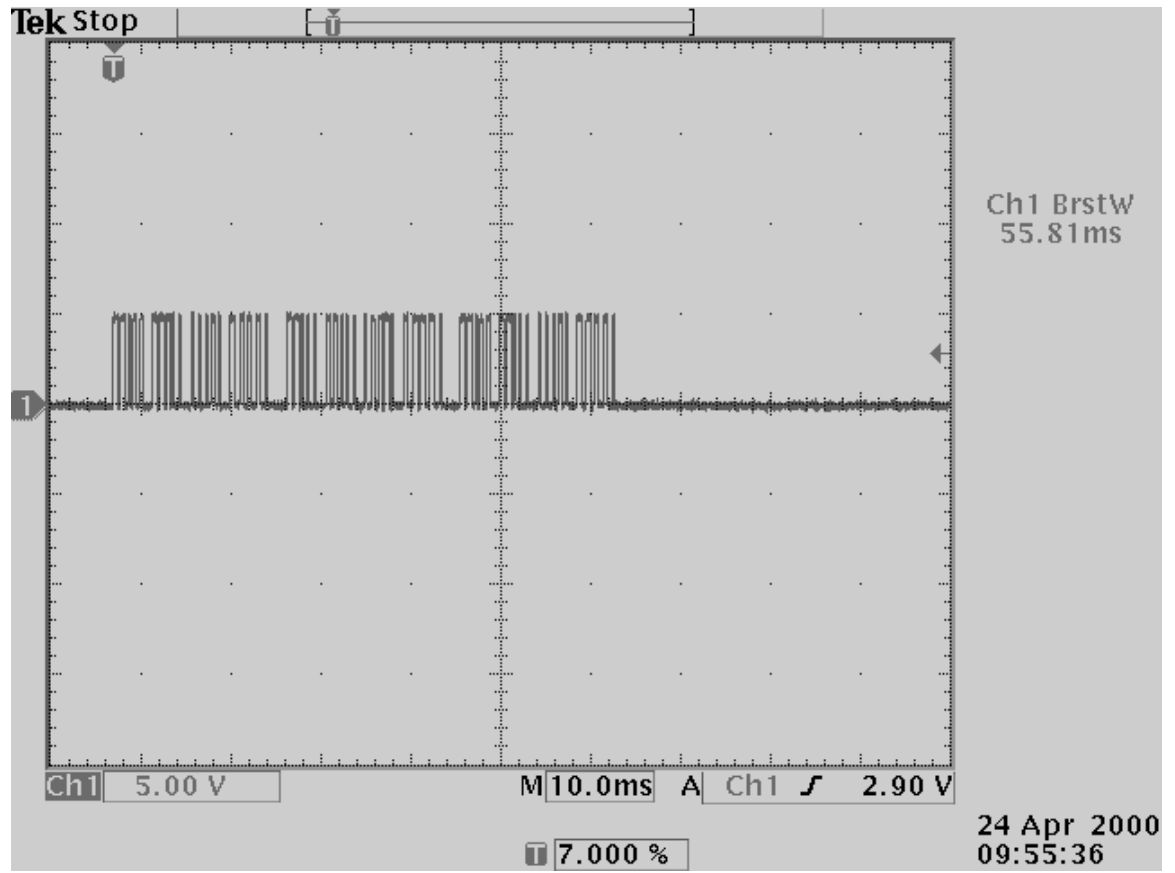


FIG 3.3 Decoded 433.92 MHz Wireless Keypad Data Stream