

Theory of Operation

General Description

The RadioWire Modem (RWM) consists of 6 different Printed Circuit Boards (PCB). The six boards are the Transceiver, I/F Demodulator, Spread Spectrum Controller, Application Processor, Backplane, and Power Supply. The antenna connects directly to the Transceiver Board through a proprietary connector that feeds through the weatherproof housing. Data and power are provided to the RWM from the outside world through a 28 pin AMP CPC connector. Differential baseband digital data connects to the RWM through twisted-pair wires.

Transmit Path

The digital data including payload and control signals is processed by a micro-processor which resides on the Application Processor Board. This payload data is handed off to the Spread Spectrum Controller Board that adds a header, groups the data into packets and spreads the data using a 12.8 MHz chip rate and a 32,768 bit spreading code. The null-to-null bandwidth of this data now occupies 25.6 MHz.

The Spread Spectrum Controller (SSC) also orchestrates the Transmit/Receive (T/R) cycle. The entire cycle takes 2.56 ms, 1.28 ms each for both transmit and receive portions (see figure 1). The transmitter operates on a 44. 5% duty cycle, $(114 \text{ bytes} * 10 \text{ us / byte}) / 2.56 \text{ ms}$, during normal operations. Eight quiet, one preamble, 102 payload and 2 CRC bytes make up the structure of transmit or receive packet (see figure 2). Since the raw data rate is 800,000 bits per second for the RWM, the one-way data handling capability is $(102 \text{ bytes} * 8 \text{ bits/byte}) / 2.56 \text{ ms} = 318,750 \text{ bits-per-second}$. During one cycle, both transmit and receive can occur making the aggregate data rate $2 * \text{one-way data rate} = 637,500 \text{ bits-per-second}$.

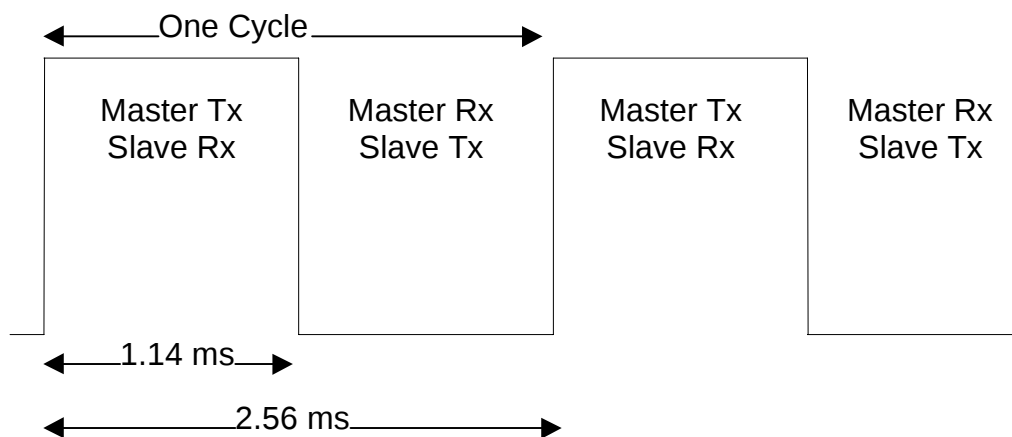
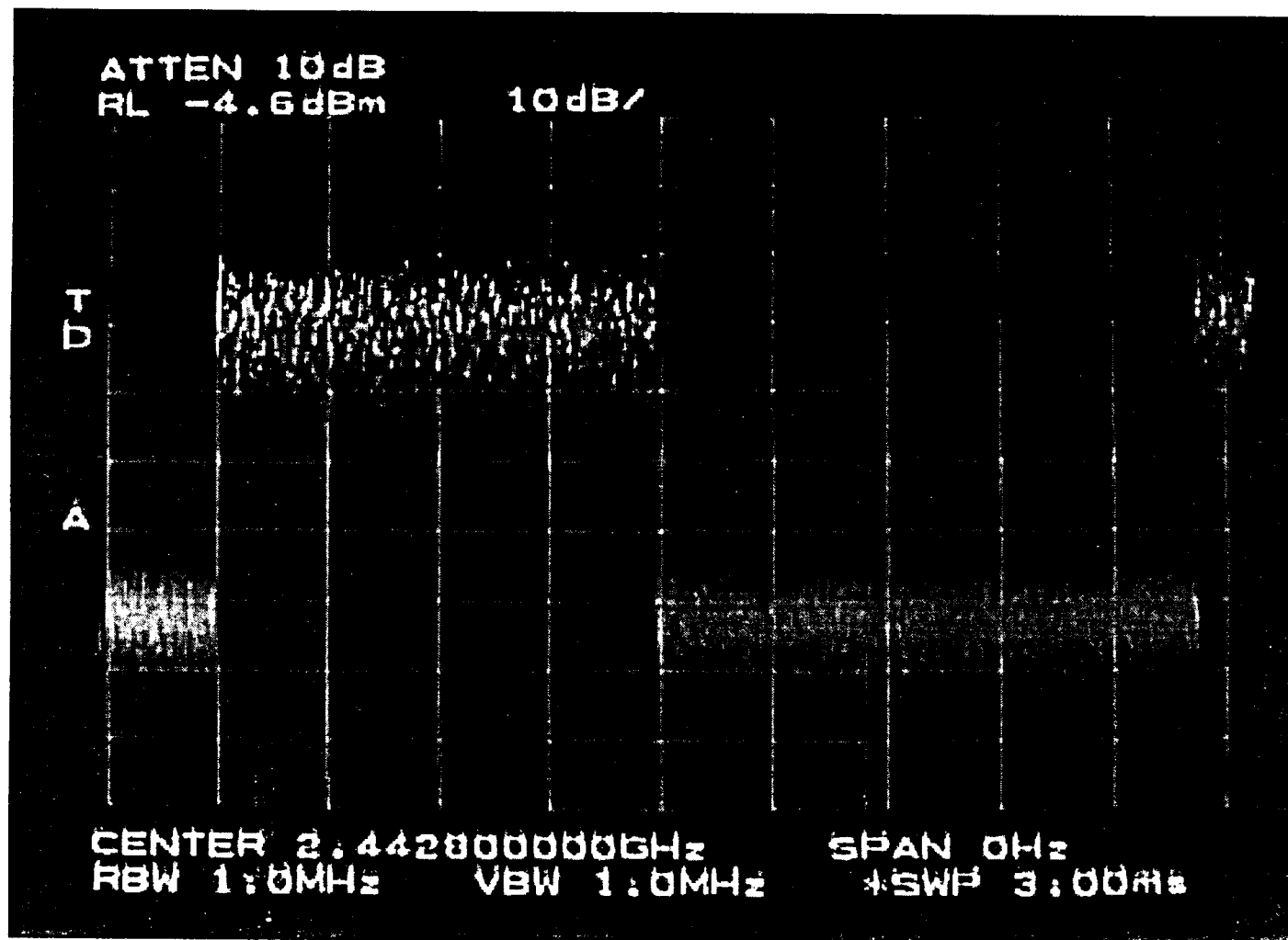


Figure 1 Transmit/Receive Timing

TRANSMIT DUTY CYCLE



SWEEP = 300ms/BOX