



Command Pro Technical Note Operating Reliability

Some equipment operators have experienced “dropouts,” or short periods in which the transmitters don’t work. It is an annoying problem, but it also can be a dangerous one if you are relying on the wireless control system to keep equipment under control. Dropouts occur for a number of reasons. They happen most often because the operating frequency band chosen is noisy with interference, the communications protocol was not designed to handle unexpected interference from other sources of RF energy, or the physical terrain causes a blockage.

The Remtron system was designed to minimize dropouts. We did that by selecting the most appropriate frequency band permitted by the FCC for license-free operation and then designing a protocol and electronics that took full advantage of the bandwidth to reliably deliver commands. At 900 MHz, we operate well above the frequency of RF noise generated by electrical equipment that is one source of interference. But 900 MHz is still low enough to permit some “bending” of our transmission around physical obstructions. The following are key features of our design that help further protect against dropouts:

- **Bandwidth** – Remtron Command Pro transmitters operate in the 900 MHz band, where wide-band operation is permitted. Many competitors operate in the 400 MHz band or at lower frequencies where only narrow-band transmissions using limited power are permitted. Bandwidth determines how quickly data may be transmitted. The narrower the bandwidth, the longer it takes to transmit the required data to issue a command to the equipment. By organizing the data into quick transmission bursts, we have decreased the probability of disruption by interference and increased the probability of successful reception. That is, we transmit more redundant packets, which reduces the probability of a noticeable dropout.
- **Power** – Our transmitters are designed for the maximum power allowed by the FCC for use on the 900 MHz band. The power authorized for fixed-spectrum transmissions is 1000 times greater than the power level authorized for other bands commonly used for license-free operation. The higher power permitted by the FCC at 900 MHz not only substantially increases the range of the transmitters, but also overpowers interfering RF energy. A strong signal at 900 MHz is like a strong FM station on your car radio. It will be received loud and clear even if there are weak signals present from any other source.
- **Decoding** – We have developed our own specialized algorithms to decode commands from our transmitters. These algorithms are designed to ignore interfering signals and to frequently retransmit messages in order to increase the probability of successfully communicating. Our special coding and signal processing is specifically designed for control of apparatus over radio waves without noticeable dropouts.
- **Antenna Polarization** – For especially noisy RF environments, Remtron has developed a specialized antenna that is designed to ignore common sources of interference. Most interference is vertically polarized. Our transmissions are horizontally polarized. By designing an antenna that is horizontally polarized, the effectiveness of the power of interfering RF energy is greatly diminished.