

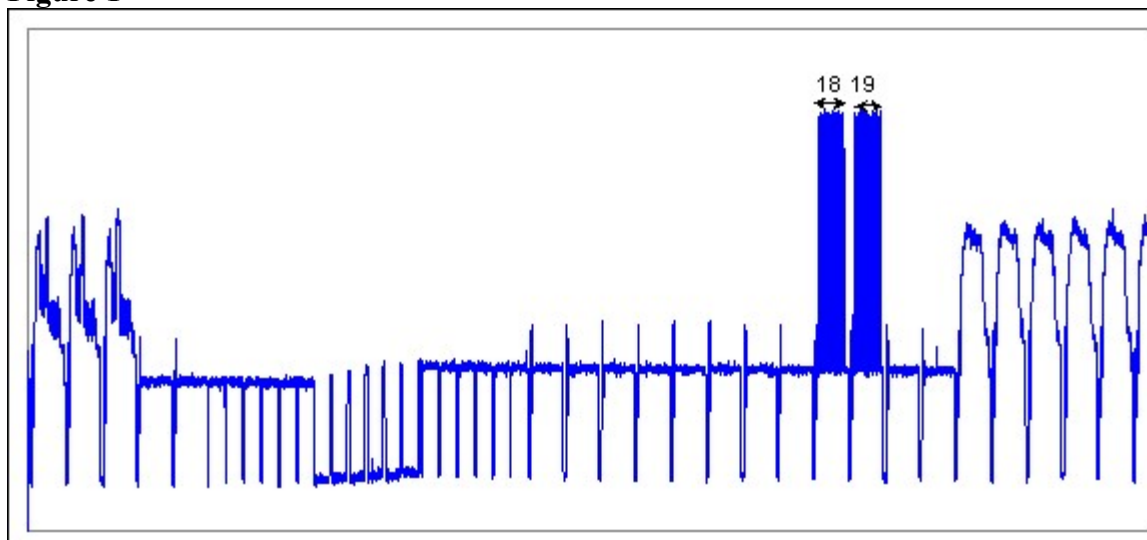
COAXITRON PROTOCOL – ELECTRICAL / TIMING SPECIFICATION

Date	Rev	Description	By
11/08/02	rev A	Initial Release	JDP
11/25/02	rev B	(document format changes only)	JDP
12/16/02	rev C	Revised rise and fall time, clarified specs and corrected errors	JDP

COAXITRON SIGNAL DESCRIPTION

Coaxitron is a communication method that was developed to allow control, of remote devices. The Coaxitron signal is transmitted on the same cable that is utilized for transmitting a baseband video signal, but is sent in the opposite direction and during the vertical blanking interval. There are two types of Coaxitron command structures. One type, Standard Coaxitron, is a series of 15 pulses, or data bits, that are sent within video line 18 of a video field. The other type, Extended Coaxitron, is a series of 32 pulses, where 16 pulses are sent in line 18 and 16 pulses in line 19 of a video field. Refer to Figure 1. No pulses are sent when the system is in an idle state.

Figure 1



For an example, the video signal is normally generated by a camera in a remote device and is transmitted through a coax cable to a distant Controlling device (Matrix, Keyboard, etc.) and monitor. The Controlling device receives the video signal and injects Coaxitron pulses onto the coax during line 18 (and possibly 19). These pulses, or data bits, are then decoded and executed by the remote device (for example, panning of the camera).

Coaxitron is an asynchronous protocol, where there is a start bit (always high level), a data bit (low or high level) and a stop bit (always low level). Refer to Figure 2. The period of the start, data and stop bits are each 1 microsecond. Therefore, the total time (period) required to send one Coaxitron data bit is 3 microseconds. Refer to Figure 3.

Figure 2 Description of One Coaxitron Bit

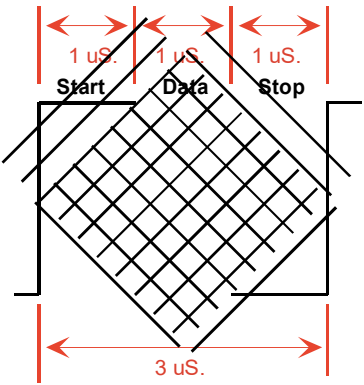


Figure 3 Coaxitron Bit Timing (Generated by Transmitter)

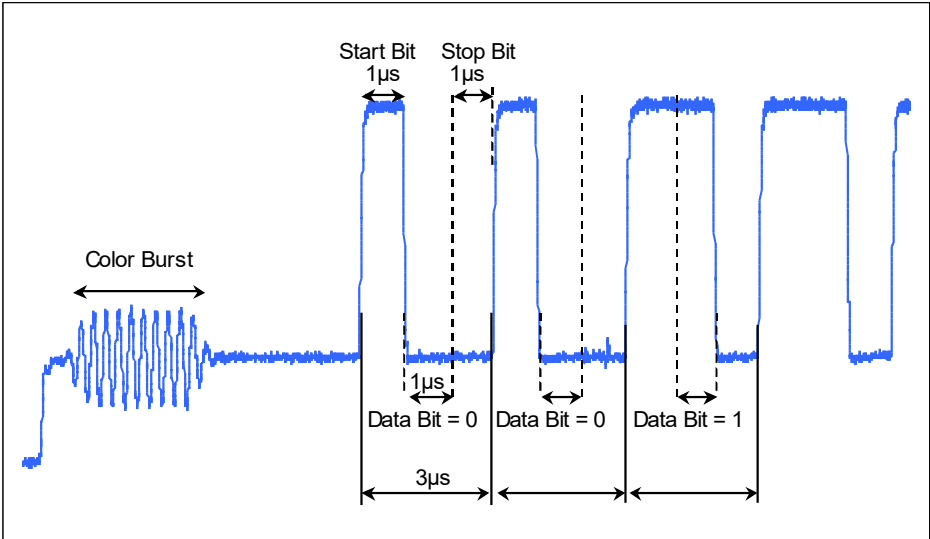
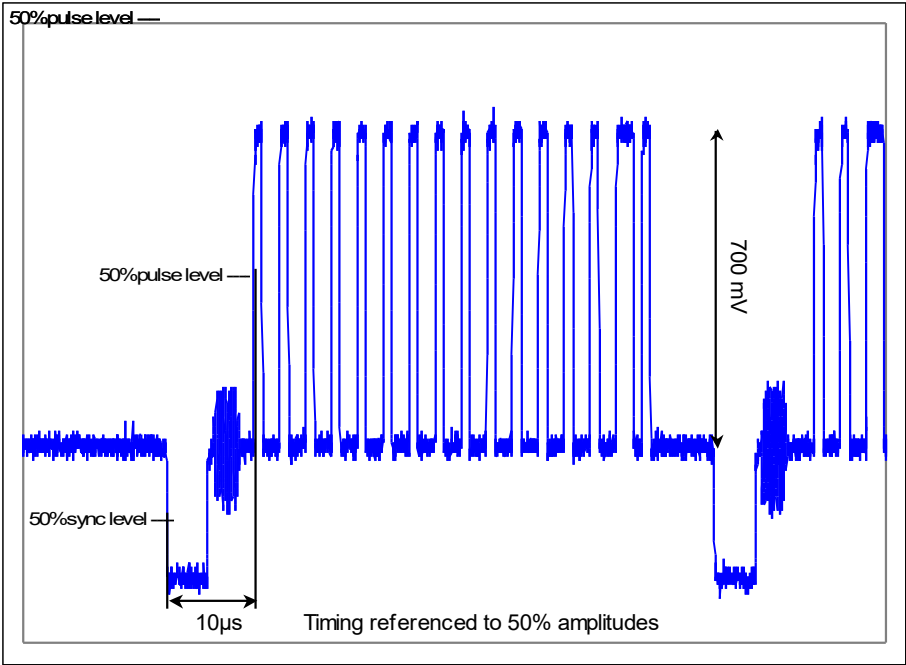


Figure 4 Coaxitron Pulse Train within Video Line

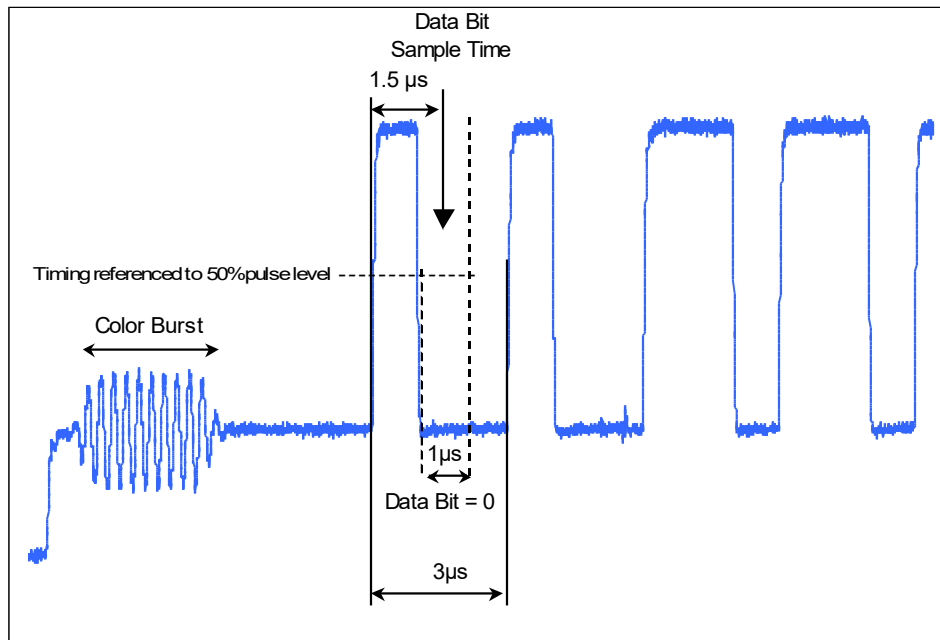


The Coaxitron data bits are sent consecutively per video line. Therefore, sending 16 bits (or pulses) would require 48 microseconds. Refer to Figure 4. Relative to blanking level of a standard 1Vp-p NTSC or PAL video signal, a high level pulse (start bit and possibly data bit) is nominally 700mV in amplitude.

The rising edge of the first Coaxitron pulse in the video line lags the leading edge of the horizontal sync pulse by 10 microseconds. This will insure the pulse does not interfere with the color burst signal.

When receiving Coaxitron, the signal level of the data bit is sampled at 1.5 microseconds after the leading edge of the start bit (sampled at center of data bit). If the level is low then the data bit is a binary 0. If the level is high, then the data bit is a binary one. Refer to figure 5.

Figure 5 Coaxitron Bit Sample Timing (Detection by Receiver)



Coaxitron data error detection should be implemented in the Receiver. Timing parameters must be verified to assure accurate data. The correct number of data bits must be present in each video line (15 or 16 pulses in line 18, 16 pulses in line 19). Pulse widths of start, data and stop bits must be within Receiver specification tolerances. Also, if Coaxitron pulses are detected outside the vertical blanking window, these should be considered errors and commands not executed.

Coaxitron Transmitter Specification

This specification covers both NTSC and PAL video signal formats.

All specifications referenced to blanking level, standard 1Vp-p video signal

DC Characteristics

Coaxitron pulse high level *	700mV +100mV,-0
Coaxitron pulse low level (absence of pulse)	black level

* Levels above 700mV exceeds standard.

AC Characteristics (timing measured at 50% amplitudes)

Coaxitron Start bit width (high pulse)	1us ±20ns
Coaxitron Data bit width (high or low pulse)	1us ±20ns
Coaxitron Stop bit width (low pulse)	1us ±20ns
Coaxitron bit period	3us ±60ns
Falling edge of h-sync to rising edge of Coaxitron pulse	10us ±0.5us
Coaxitron high pulse Rise time, 10% to 90% level	140ns max.
Coaxitron high pulse Fall time, 90% to 10% level	140ns max.

Coaxitron Receiver Specification

This specification covers both NTSC and PAL video signal formats.

DC Characteristics

Coaxitron pulse high level threshold detection	320mV ± 10mV
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AC Characteristics (timing measured at 50% amplitudes)

Coaxitron Data bit detection timing from rising edge of Start bit to sample time	1.5us ±100ns
Coaxitron Start, Data & Stop pulse width detection tolerance	1us ±250ns
Coaxitron Data Bit or Pulse Count per Video line	15 or 16 Pulses/line

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