Range Data Interface

Allows a Phantom v12.1 to record arbitrary digital data, of up to 128-bits per frame

Introduction

The Phantom v12.1 camera provides a mechanism that can be used to tag image frames with data supplied over the range data interface. This mechanism is an extension of the time stamp storage system; range data tags are treated very much like timestamps and the event signal.

While primarily intended for acquisition of altitude/azimuth/range information from tracking mounts, the range data input does not impose any formatting on the actual data recorded; as such, it can be used to record arbitrary digital data, of up to 128-bits/frame.

This document contains a preliminary description of the interface, and is subject to change. Contact Vision Research for the latest information.

Electrical Interface

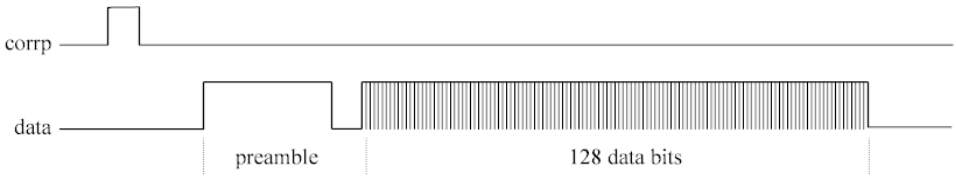
The range data interface consists of 2 differential pairs. The differential pairs use RS-422 signaling levels, and are intended to be used in point-to-point connections. The signals are:

Signal	Function	Description
corrp+, corrp-	Correlation pulse output.	A 4 µs correlation pulse is output at the end of each exposure, synchronous with the time acquisition pulse.
data+, data-	Serial data input.	A 100 Ω termination resistor is placed across the serial data input pair.

The signals are made available on a 6-pin circular connector, with the pin out as shown in the table below:

Pin	Signal
A	Correlation pulse output.
B	Serial Data Input +
C	Serial Data Input -
D	Correlation Pulse Output +
E	Correlation Pulse Output -
F	Signal Ground

Interface Timing



Correlation Pulse

At the end of the exposure of each frame (the moment time stamps are taken), a pulse is output on the `corrp` signal. The pulse is 4 µs in duration and has positive polarity.

Data Input

The data input carries an asynchronous data stream with the following characteristics:

Pin	Signal
Data Rate	5 MHz
Bit Encoding	NRZ (Non-Return to Zero)
Bit Sequence	LSB (Least Significant Bit) transmitted first
Logic Levels	Positive

After the end of correlation pulse, the camera expects the data line to be in the idle state for a period not exceeding 100µs, followed by a 32 or 64 bit preamble and 128 bits of data.

The preamble consists of between 31 and 63 contiguous '1' bits, followed by a single '0' bit. The falling edge of the preamble's '0' bit is used to synchronize the receiver clock.

After the preamble is detected, the 128 data bits following are shifted into a shift register. At the rising edge of the next correlation pulse, the data from the shift register is combined with the current time, and sent to the recording system. After that, the shift register is cleared and made ready for shifting in more data.

Data Storage

The range data acquired for each frame is stored in four 32-bit words inside the time stamps. The current value can be obtained by examining the variables `irig.rng0 ... irig.rng4`. The serial data stream is mapped to these variables as shown in below:

The 128 data bits recorded typically contain time, azimuth, elevation, range and status information. The camera

does not interpret the data fields in any way.

The range data stamp stored for each frame is the one that has been clocked since the end of exposure of the previous frame. If no data is clocked for a specific frame, the range data words will all be zero.

The space for storing range data stamps is allocated when the camera memory is partitioned. For some combinations of camera memory size and resolutions, storage limitations may make storage of range stamps impossible: this will happen when the largest sizes of camera memory (e.g. 8Gb) are used with small frame sizes. In these cases, because of the excessive storage requirements, range data recording will be disabled.

Revision Log

Pin	Signal
0.1	First version of the document
0.2	Changed to support PSI data format
1.0	Updated to meet new company document format