

ConfoCor 2 - Description of the Raw Data Format

The data format is an exact representation of the dual channel photon trace within the limits given by the digitalisation. This means, that within these limits the data are recorded without losses.

The basic idea is to record the time between subsequent pulses from the detector in units of elapsed clock cycles (run length encoding). However, the format is modified to conserve space at high count rates and to be capable to handle dual channel data.

Data will be recorded in 16 bit words. Whenever a pulse is detected or the counter counting the clock cycles overruns 255 (FF hex), a word will be recorded. The word will contain information how many clock cycles elapsed (1 ... 255) since the last word had been recorded and additionally what happened in the four cycles of data generation *bt1* ... *bt4*. The recorded word has the following structure:

Bit	meaning
0 (LSB) ... 7	clock counter value (starting at 1) during the triggering event trigger events are pulse recordings or counter overruns zero is reserved and only transmitted at the end of the measurement
8	1, if pulse recorded in channel 1 during cycle <i>bt1</i> ; else 0
9	1, if pulse recorded in channel 2 during cycle <i>bt1</i> ; else 0
10	1, if pulse recorded in channel 1 during cycle <i>bt2</i> ; else 0
11	1, if pulse recorded in channel 2 during cycle <i>bt2</i> ; else 0
12	1, if pulse recorded in channel 1 during cycle <i>bt3</i> ; else 0
13	1, if pulse recorded in channel 2 during cycle <i>bt3</i> ; else 0
14	1, if pulse recorded in channel 1 during cycle <i>bt4</i> ; else 0
15 (MSB)	1, if pulse recorded in channel 2 during cycle <i>bt4</i> ; else 0

Table 1: Structure of the recorded word

The two examples will hopefully make these statements clearer. The tables show part of the running pulse train (from left to right) divided into clock cycles. A „1“ in the corresponding box indicates, that a pulse arrived in this cycle. The „counter“ row shows the counter readings. In the lowest row it is indicated, when the word is recorded.

				bt1	bt2	bt3	bt4							bt1	bt2	bt3	bt4		
CH 1				1		1						...							
CH 2					1							...							
counter	120	121	122	123	0	0	0	1	2	3	4	...	254	255	0	0	0	1	2
							↑ W1										↑ W2		

Table 2: Example 1

Example 1: The following words will be recorded:

- at W1: high byte: 00011001(bin) = 19 (hex); low byte: 123 (dec) = 7B (hex); resulting word = 7B19 (hex)
- at W2: high byte: 00000000(bin) = 00 (hex); low byte: 255 (dec) = FF (hex); resulting word = FF00 (hex)

				bt1	bt2	bt3	bt4							bt1	bt2	bt3	bt4		
CH 1				1		1						...			1				
CH 2												...				1			
counter	120	121	122	123	0	0	0	1	2	3	4	...	254	255	0	0	0	1	2
							↑ W3										↑ W4		

Table 3: Example 2

Example 2: The following words will be recorded:

- at W3: high byte: 00010001(bin) = 11 (hex); low byte: 123 (dec) = 7B (hex); resulting word = 7B11 (hex)
- at W4: high byte: 00100100(bin) = 24 (hex); low byte: 255 (dec) = FF (hex); resulting word = FF24 (hex)

The clock runs at a clock rate of 20 MHz. That means, the maximum data rate is 10 Mbyte/s. If no pulses are recorded the clock rate drops to approx. 155 Kbyte/s according to counter overflows.

The first 30 bytes of the raw data file contain the comment "ConfoCor_2_-_Raw_data_file_1.0" and have to be neglected.