40 MHZ ACQUISITION CARD CHARACTERIZATION

Thursday, April 05, 2001

1. Video to Pixel Clock delay

1.1.All BNC

When the pixel clock is supplied on the front BNC connectors of the acquisition card, there is a delay between the Video input and the convert clock, with the convert clock delayed. This delay varies between approx 42 ns (when the Pixel Clock period is 25 ns), and 476 ns (when the Pixel Clock period is 4 µs).
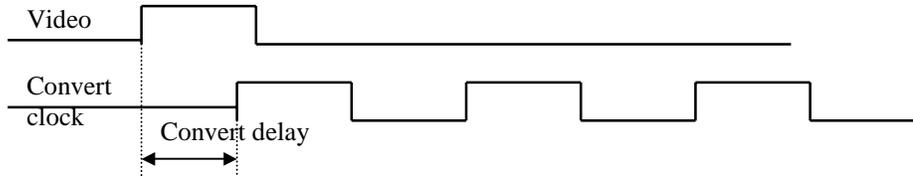
The following table is an empirical determination of this delay at various frequencies.

Freq [MHz]	Per [ns]	Video -> Convert delay [ns]	Measure Strobe Range [ns]	Measure Strobe Range [% of Pxlclk]
40.000	25	42	26.8	107.20%
33.333	30	41.5	30	100.00%
28.571	35	41.1	35	100.00%
25.000	40	41.2	40	100.00%
22.222	45	41	45	100.00%
20.000	50	41	50	100.00%
16.667	60	41	59.6	99.33%
14.286	70	40.7	72.4	103.43%
12.500	80	41	82.2	102.75%
11.111	90	40.8	92.5	102.78%
10.000	100	41	103.8	103.80%
9.901	101	100	68	67.33%
9.091	110	101	76	69.09%
8.333	120	102	85	70.83%
5.000	200	110	152	76.00%
3.333	300	120	236	78.67%
2.500	400	130	326	81.50%
2.000	500	142	414	82.80%
1.000	1000	194	840	84.00%
0.800	1250	220	1056	84.48%
0.667	1500	244	1276	85.07%
0.571	1750	269	1488	85.03%
0.500	2000	290	1710	85.50%
0.400	2500	340		
0.333	3000	386		
0.250	4000	476		

At frequencies between 10 MHz and 40 MHz the delay is pretty much constant : 41ns, and a fixed delay line (a coax cable) will be enough to compensate for it. At frequencies below 10 MHz, we recommend using a variable delay line.

The user is adviced to use the AD CONV CLOCK and VIDEO MONITOR outputs to adjust the timing. We recommend using a coaxial cable to generate an extra delay for the video input, so that it alligns with the convert clock.

==FAILURE TO ALIGN THE VIDEO INPUT WITH THE CONVERT CLOCK, WILL RESULT IN ERRORS IN THE ACQUISITION PROCESS: PIXELS WILL BE SKIPPED AND THE "MEASURING STROBE" ADJUSTMENT WILL NOT WORK PROPERLY.==

1.2. Fanout card (All Backplane)

When the fanout card is used to drive the clocks (Pixel, Line and Frame) an extra delay of 52 ns is introduced. The user should compensate for this delay again, by monitoring the AD CONV CLOCK and VIDEO MONITOR outputs to adjust the timing.

2. Measure Strobe range

The range over which the Measure Strobe varies is shown in the above table.
At frequencies between 10 MHz and 40 MHz the range delay is pretty much constant: 100%. At frequencies below 10 MHz, the range varies between 75% and 85%.

3. Clocks setup

The Frame and Line clocks are sampled by the Pixel clock on the rising edge.
First the Frame clock is sampled: the detection of a Frame pulse arms the acquisition card.
Then the Line clock is sampled, and a valid Line pulse triggers the acquisition.
The first valid pixel is the pixel following the first rising edge of the Line clock, following the detection of a Frame clock pulse.
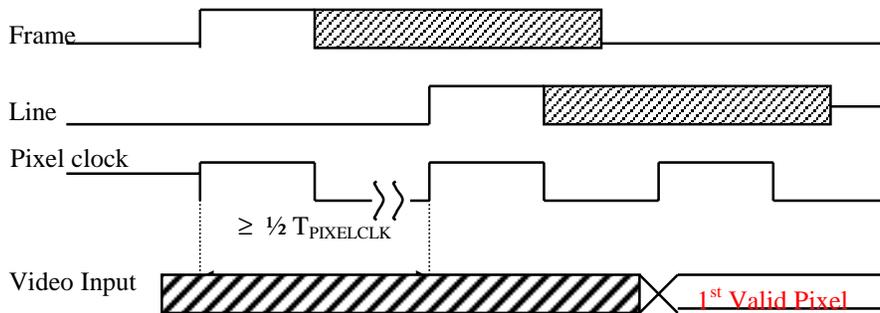

The LINE CLOCK must NOT be sampled on the same PIXEL CLOCK as the FRAME. There must be a DELAY of at least HALF of a PIXEL CLOCK between FRAME and LINE.

3.1. Frame

The FRAME CLOCK has to meet the following time requirements with respect to the PIXEL CLOCK. All measurements were taken at the BNC front panel connectors.

PIXEL to FRAME setup time:
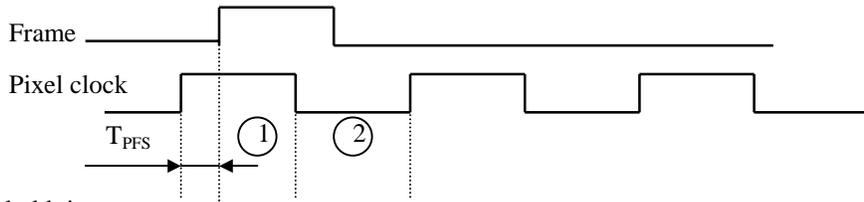
FRAME to PIXEL hold time:
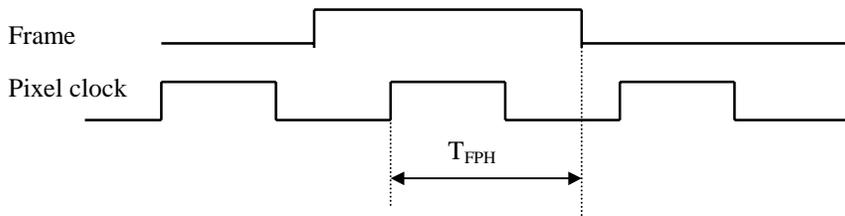
3.2. Line

The LINE CLOCK has to meet the following time requirements with respect to the PIXEL CLOCK. All measurements were taken at the BNC front panel connectors.

LINE to PIXEL setup time:
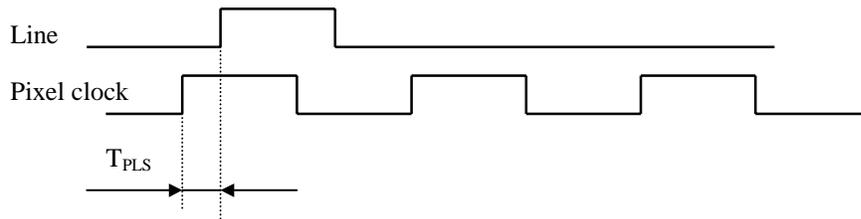
LINE to PIXEL setup time:
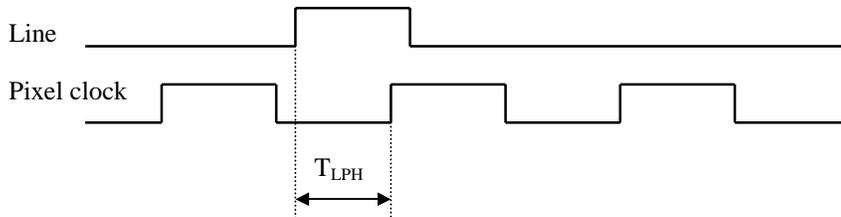
3.3. Timing Characteristics

The following table describes the setup times for the Frame and Line "Pulses":

Parameter	Description	Min [ns]	Max [ns]	Notes
T_{PFS}	Pixel to Frame Setup		0.2	(1)
T_{FPH}	Frame after Pixel Hold	½ $T_{PIXELCLK}$	-	
T_{PLS}	Pixel to Line Setup		3	(1)
T_{LPH}	Line after Pixel Hold	½ $T_{PIXELCLK}$	-	

Notes:

If the Pixel Clock Precedes this "Pulse" by more than the Max specified value, the "Pulse" will be sampled on the next Pixel Clock.