

Determination of timings using EXTA

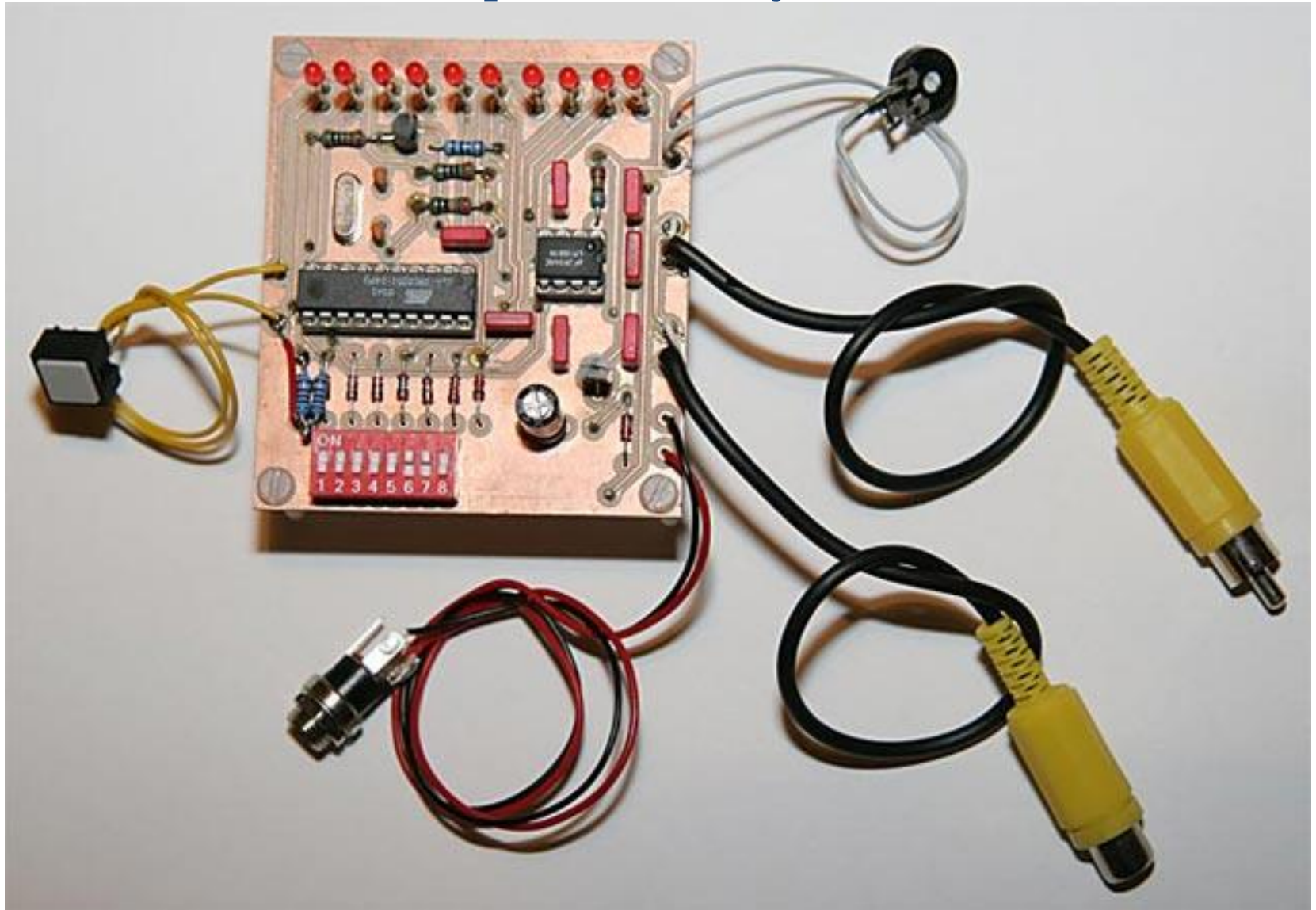
ESOP XXXVI - Freiberg
September 17, 2017

Gerhard Dangl
www.dangl.at

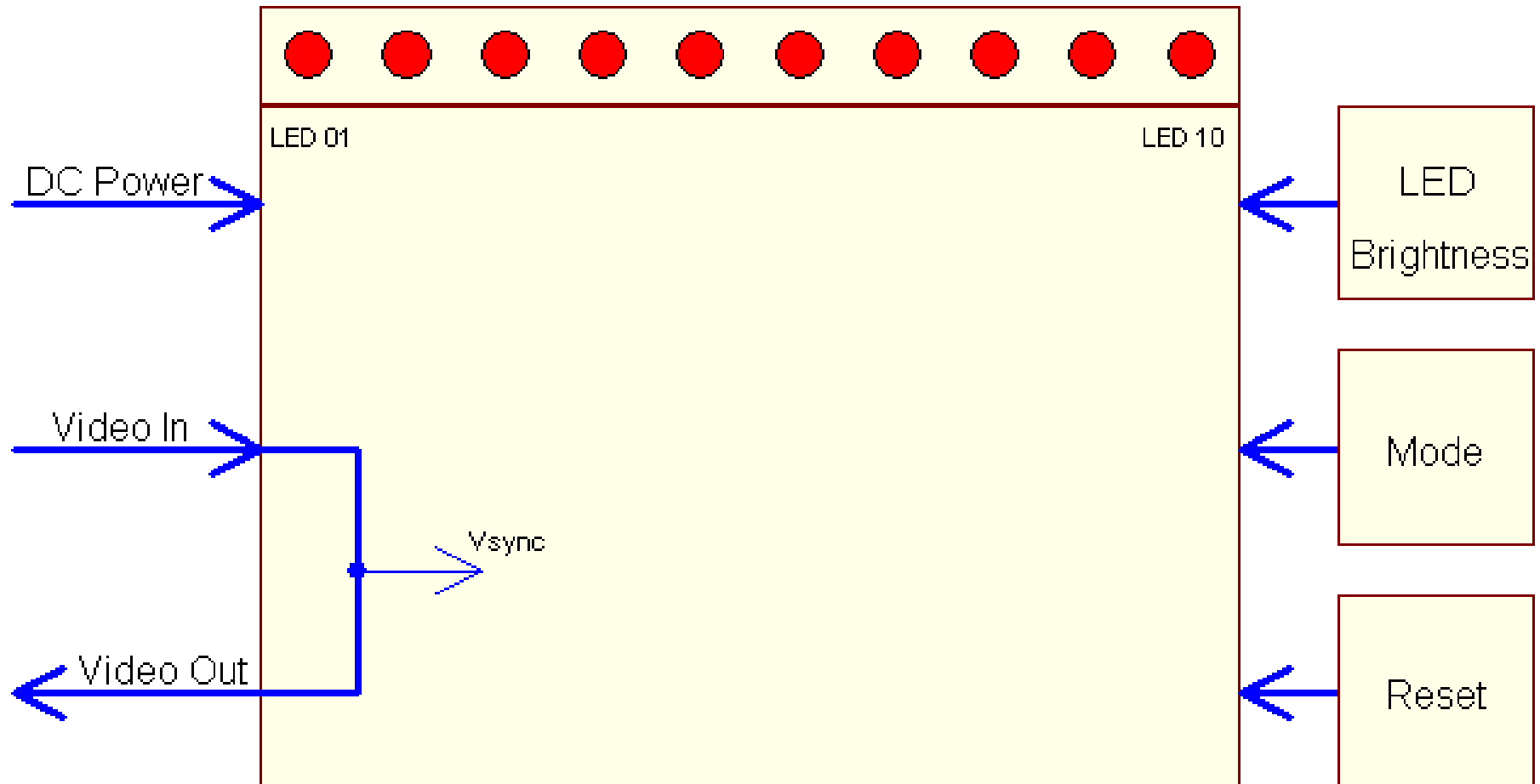
Three devices for measurements on camera systems

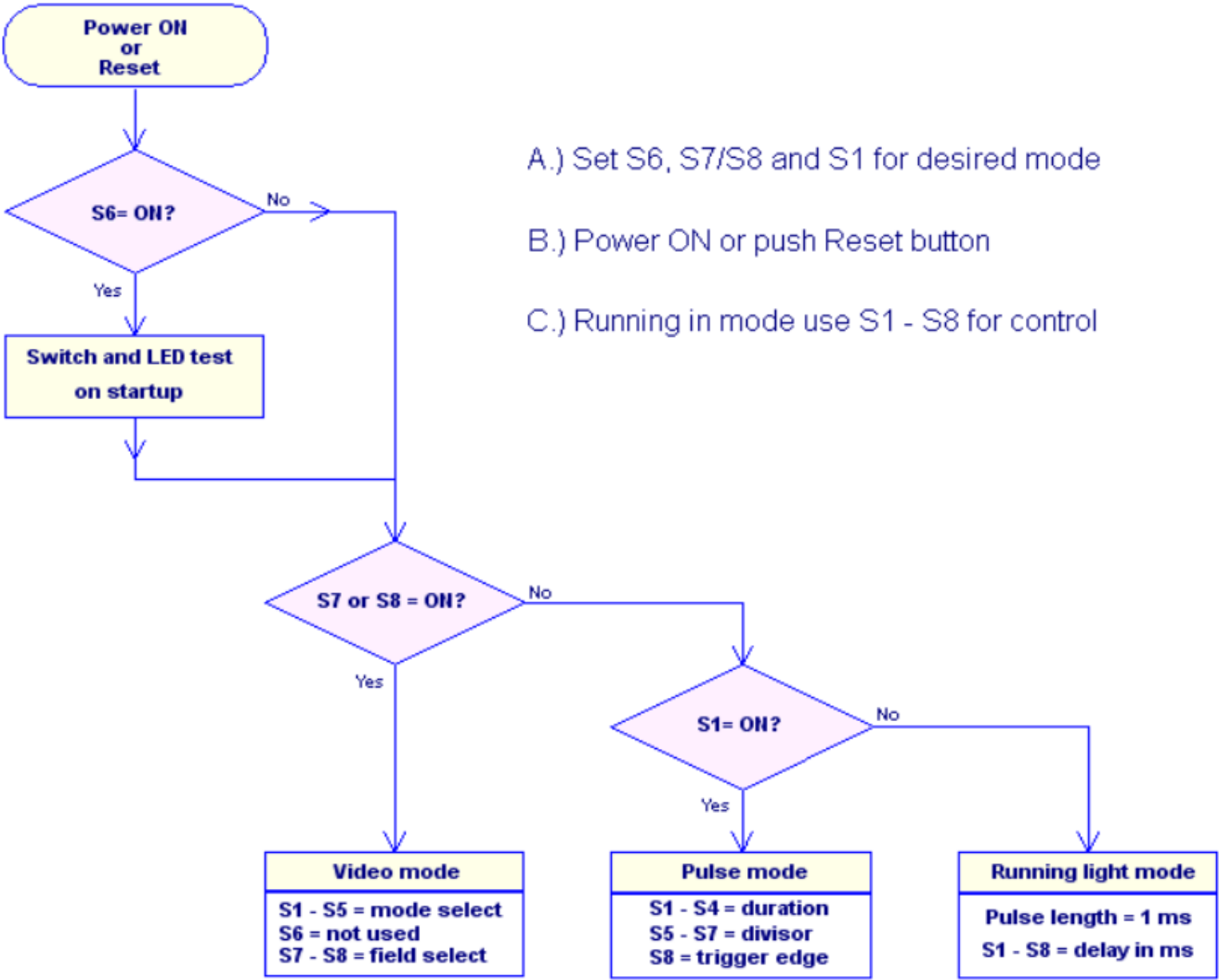
DASCO, EXTA and VEXA

Video EXposure Analyzer - VEXA



VEXA – Function diagram





A.) Set S6, S7/S8 and S1 for desired mode

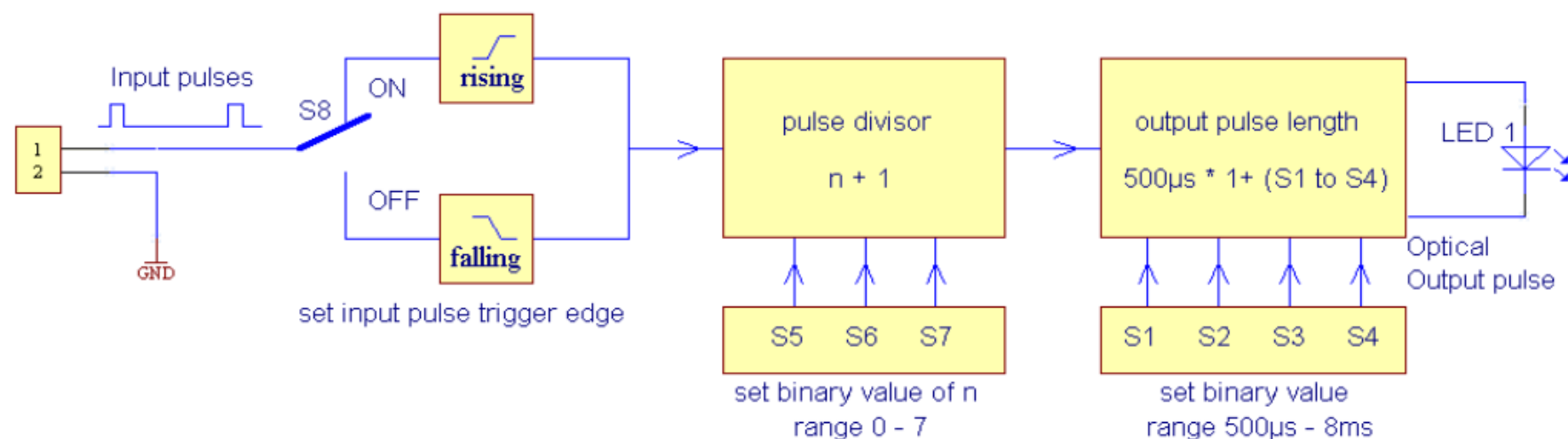
B.) Power ON or push Reset button

C.) Running in mode use S1 - S8 for control

After startup sequence use switches S1 - S8 for details control in selected mode

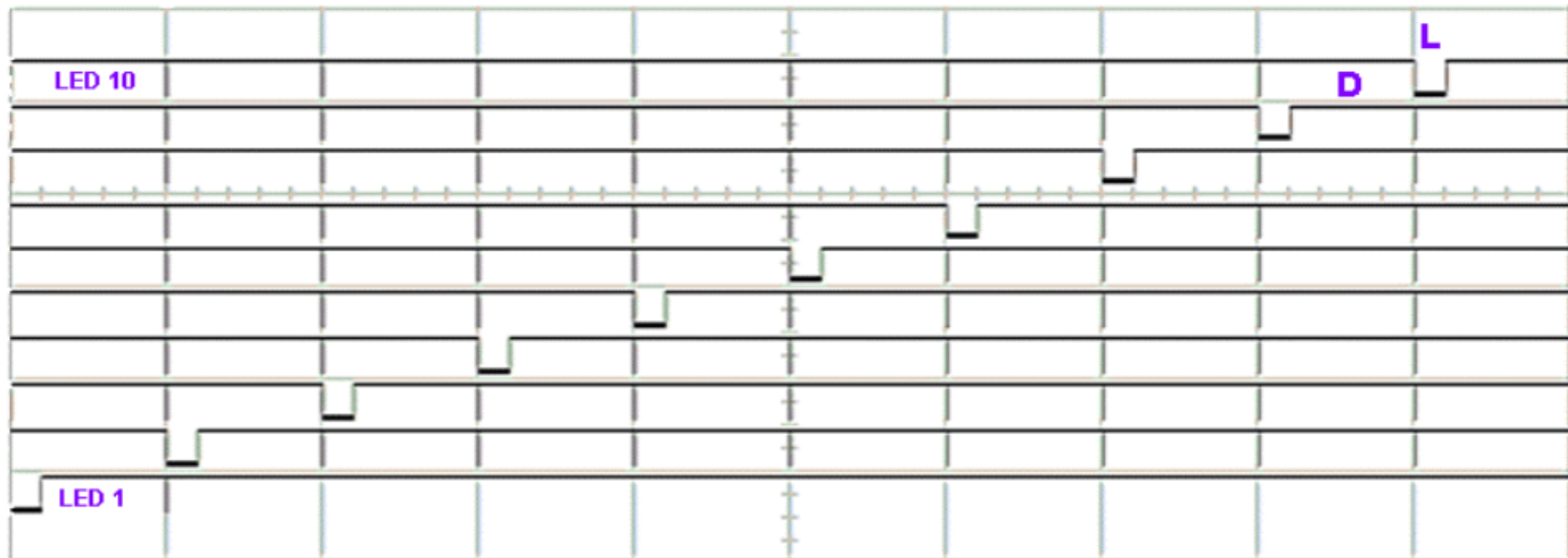
VEXA2.0

Pulse mode function diagram



VEXA – Running light mode

VEXA 2.0 - Running light mode



L ... LED lit time is always a fixed value of 1ms

D ... Delay between lit LEDs 1 to 10 is set as binary value with S1 to S8 (0 - 255ms)

LED timing control					PAL or NTSC Video - Field (Odd or Even)																											
Mode	Switch 1 2 3 4 5	Start-Delay [ms]	LED-Step [ms]	Lit-Range [ms]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20								
0	0 0 0 0 0	00.000	2.000	00.000 - 20.000																												
1	1 0 0 0 0	10.000	1.000	10.000 - 20.000																												
2	0 1 0 0 0	05.000	1.000	05.000 - 15.000																												
3	1 1 0 0 0	00.000	1.000	00.000 - 10.000																												
4	0 0 1 0 0	15.000	0.500	15.000 - 20.000																												
5	1 0 1 0 0	11.000	0.500	11.000 - 16.000																												
6	0 1 1 0 0	07.000	0.500	07.000 - 12.000																												
7	1 1 1 0 0	03.000	0.500	03.000 - 08.000																												
8	0 0 0 1 0	00.000	0.500	00.000 - 05.000																												
9	1 0 0 1 0	18.000	0.200	18.000 - 20.000																												
10	0 1 0 1 0	16.200	0.200	16.200 - 18.200																												
11	1 1 0 1 0	15.000	0.200	15.000 - 17.000																												
12	0 0 1 1 0	13.200	0.200	13.200 - 15.200																												
13	1 0 1 1 0	11.600	0.200	11.600 - 13.600																												
14	0 1 1 1 0	00.000	0.200	00.000 - 2.000																												
15	1 1 1 1 0	19.000	0.100	19.000 - 20.000																												
16	0 0 0 0 1	18.200	0.100	18.200 - 19.200																												
17	1 0 0 0 1	17.400	0.100	17.400 - 18.400																												
18	0 1 0 0 1	16.500	0.100	16.500 - 17.500																												
19	1 1 0 0 1	15.900	0.100	15.900 - 16.900																												
20	0 0 1 0 1	15.000	0.100	15.000 - 16.000																												
21	1 0 1 0 1	00.000	0.100	00.000 - 1.000																												
22	0 1 1 0 1	19.800	0.020	19.800 - 20.000																												
23	1 1 1 0 1	19.640	0.020	19.640 - 19.840																												
24	0 0 0 1 1	16.500	0.020	16.500 - 16.700																												
25	1 0 0 1 1	16.340	0.020	16.340 - 16.540																												
26	0 1 0 1 1	00.900	0.020	00.900 - 01.100																												
27	1 1 0 1 1	00.720	0.020	00.720 - 00.920																												
28	0 0 1 1 1	00.540	0.020	00.540 - 00.740																												
29	1 0 1 1 1	00.360	0.020	00.360 - 00.560																												
30	0 1 1 1 1	00.180	0.020	00.180 - 00.380																												
31	1 1 1 1 1	00.000	0.020	00.000 - 00.200																												
V_SYNC @ 00.00ms =>					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20								

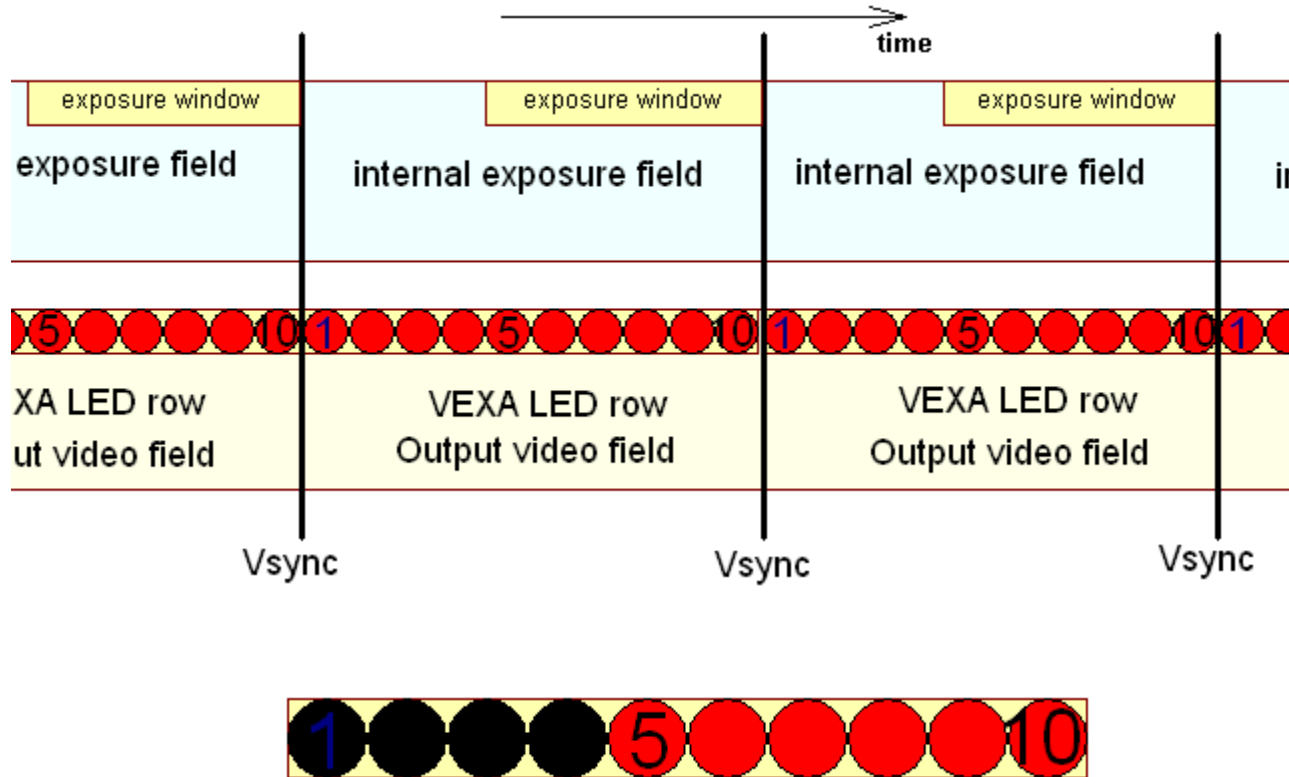
System	Rate	Frame	Field
PAL	25.00 fps	40.0000 ms	20.00000 ms
NTSC	29.97 fps	33.3667 ms	16.68335 ms

Switch
Function

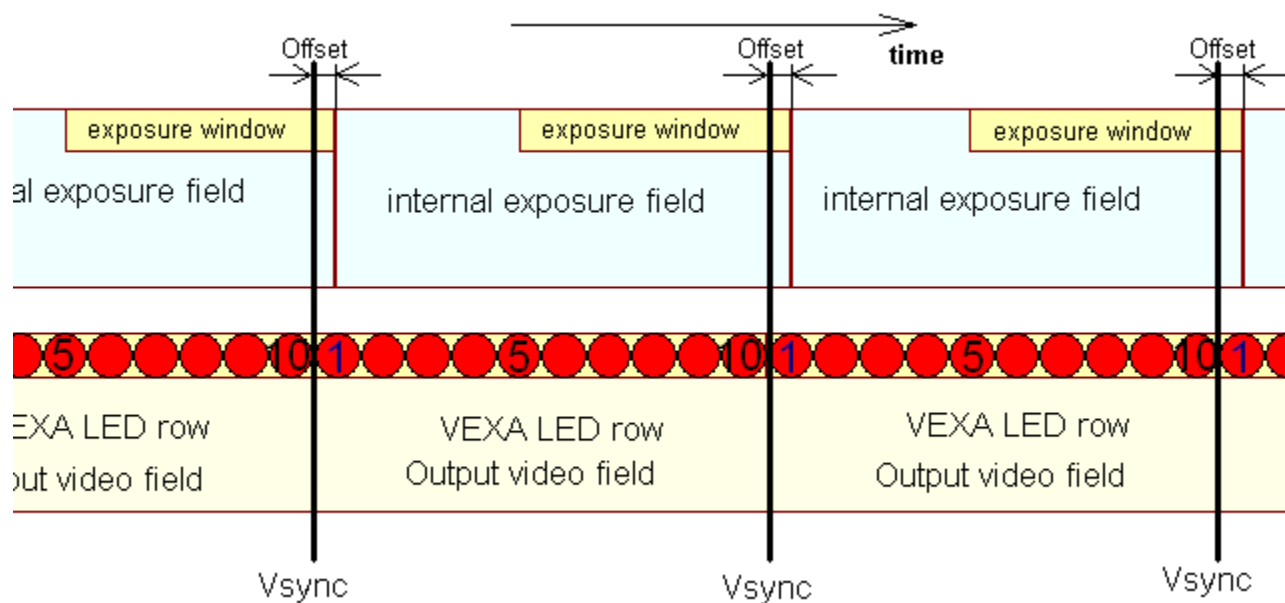
S1	S2	S3	S4	S5	S6	S7	S8
LED timing control						Odd	Even

 = Single LED ON (1 of 10)

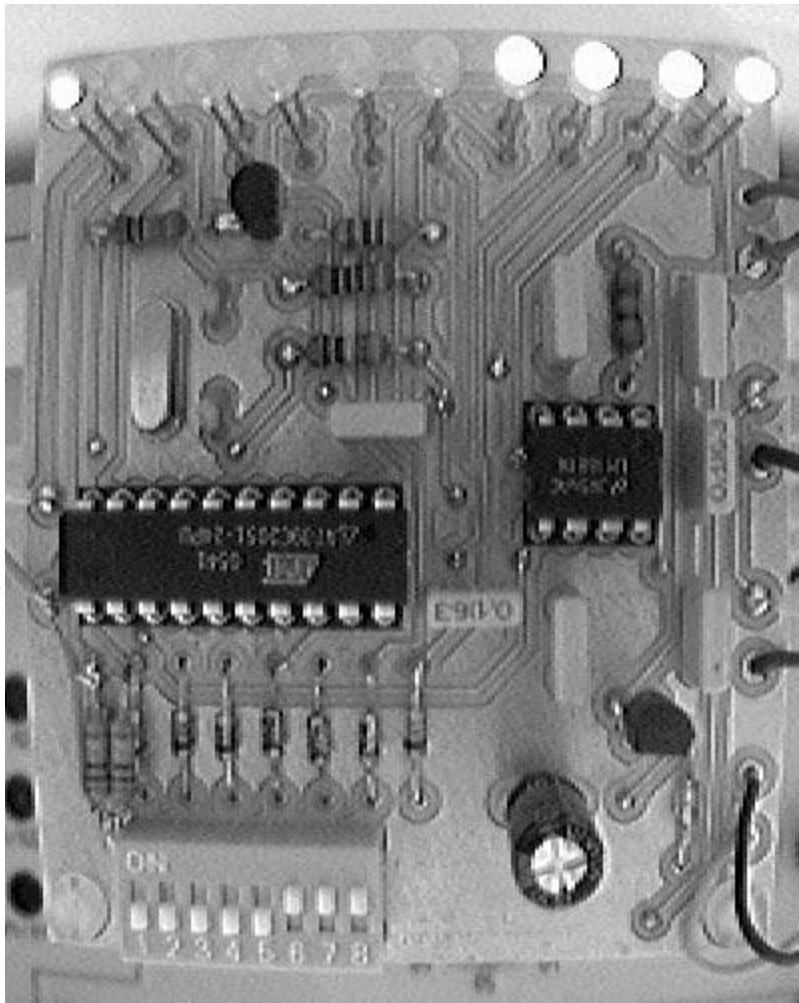
Video timing - ideal



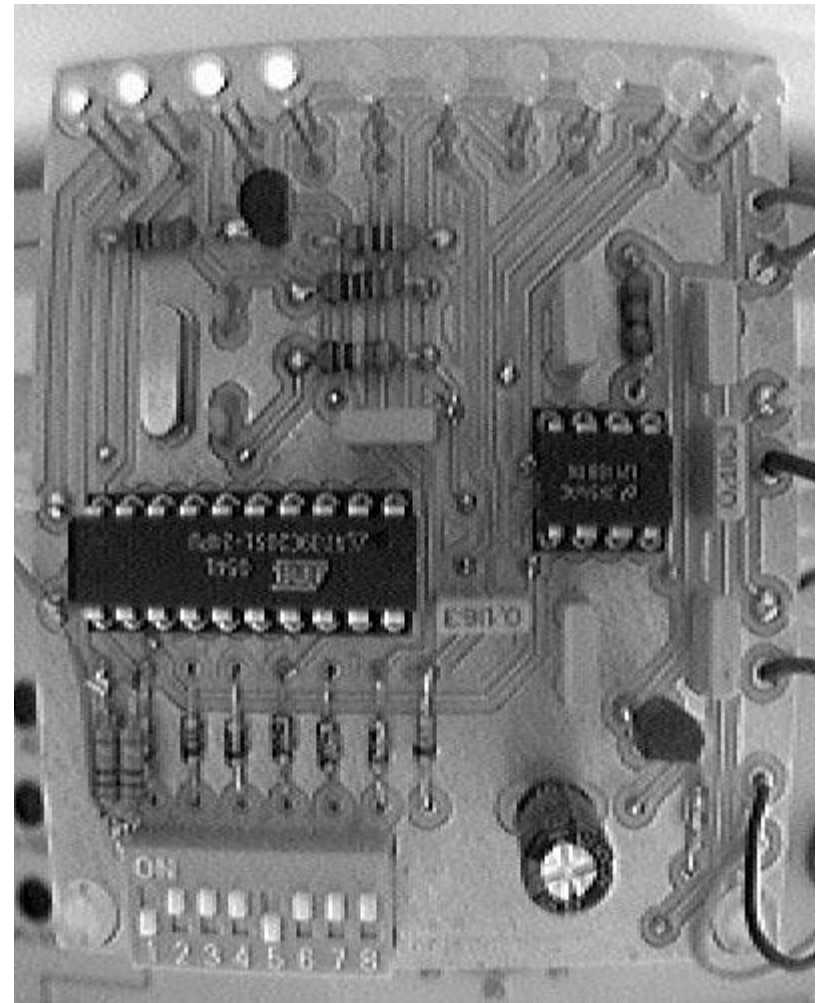
Video timing - real



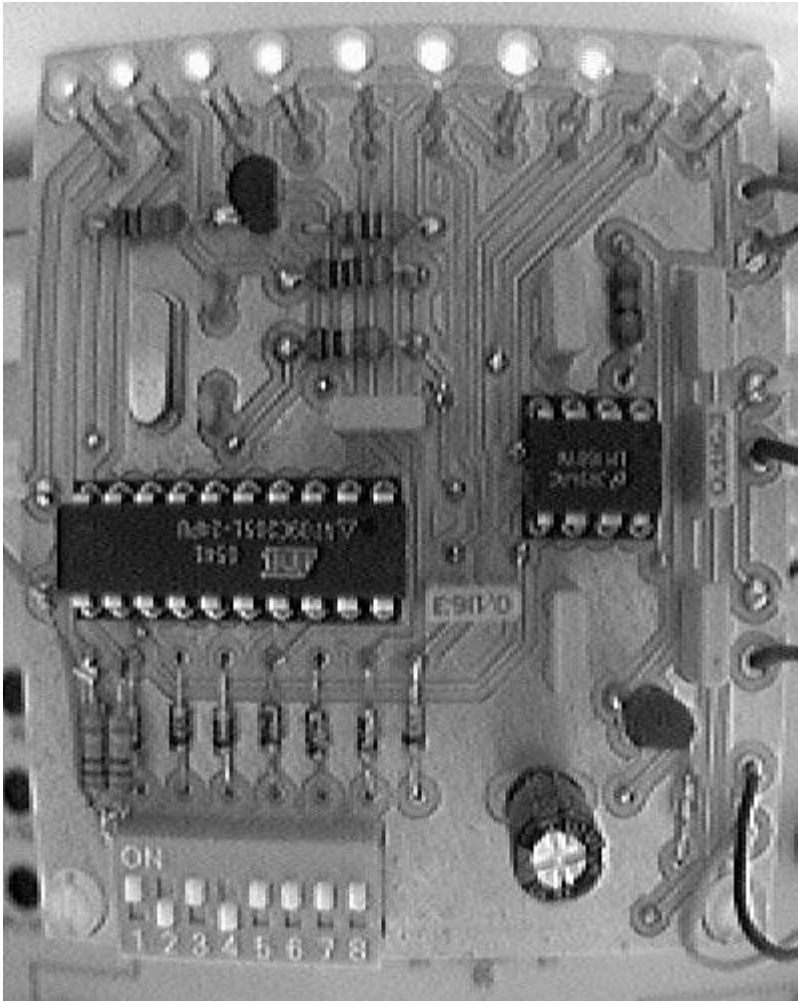
Range 0-20ms / LED step 2ms



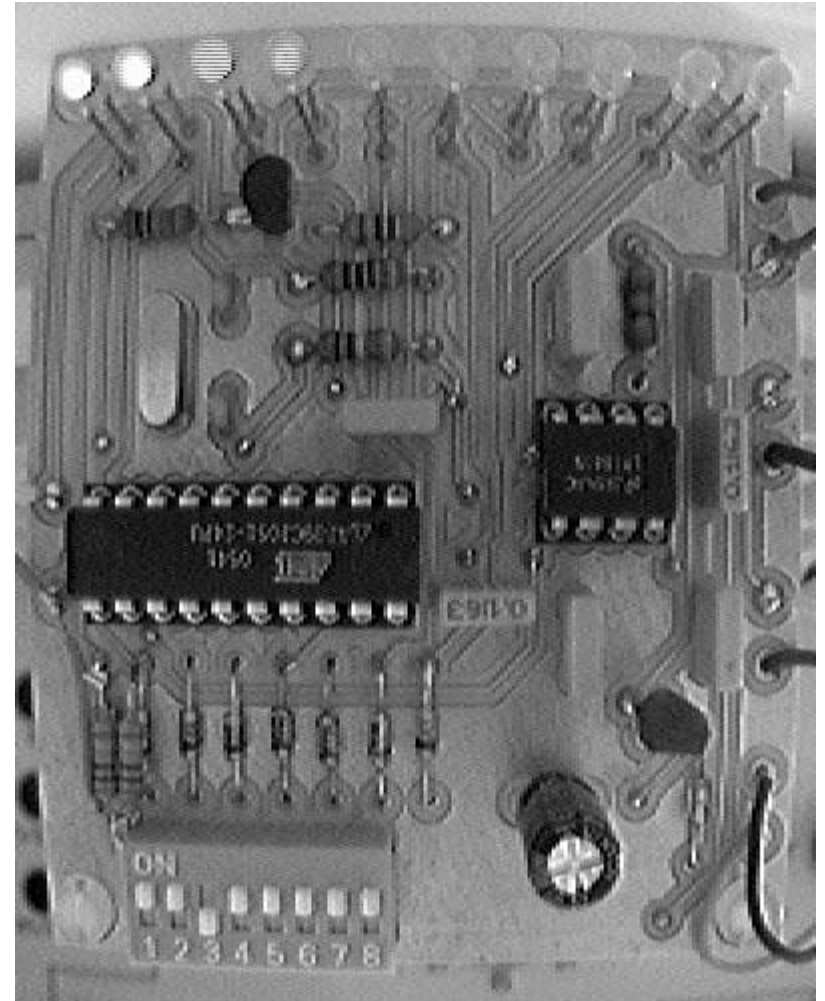
Range 0-2ms / LED step 200 μ s



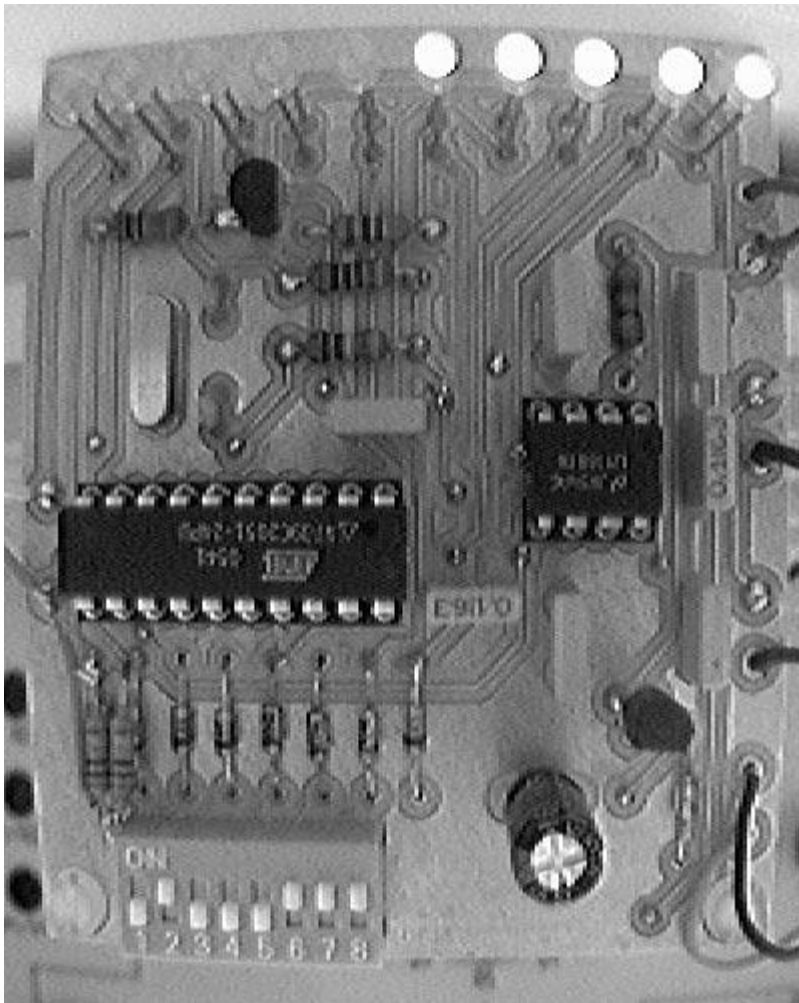
Range 0-1ms / LED step 100 μ s



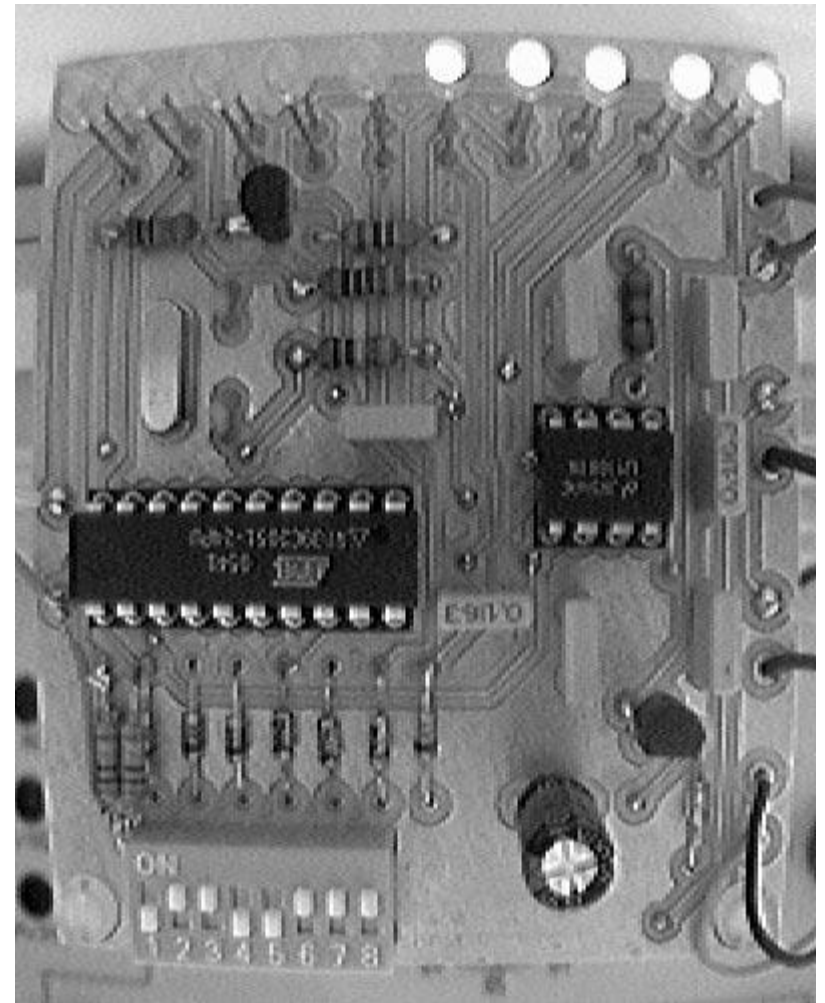
Range 720-920 μ s / LED step 20 μ s



Range 5-15ms / LED step 1ms



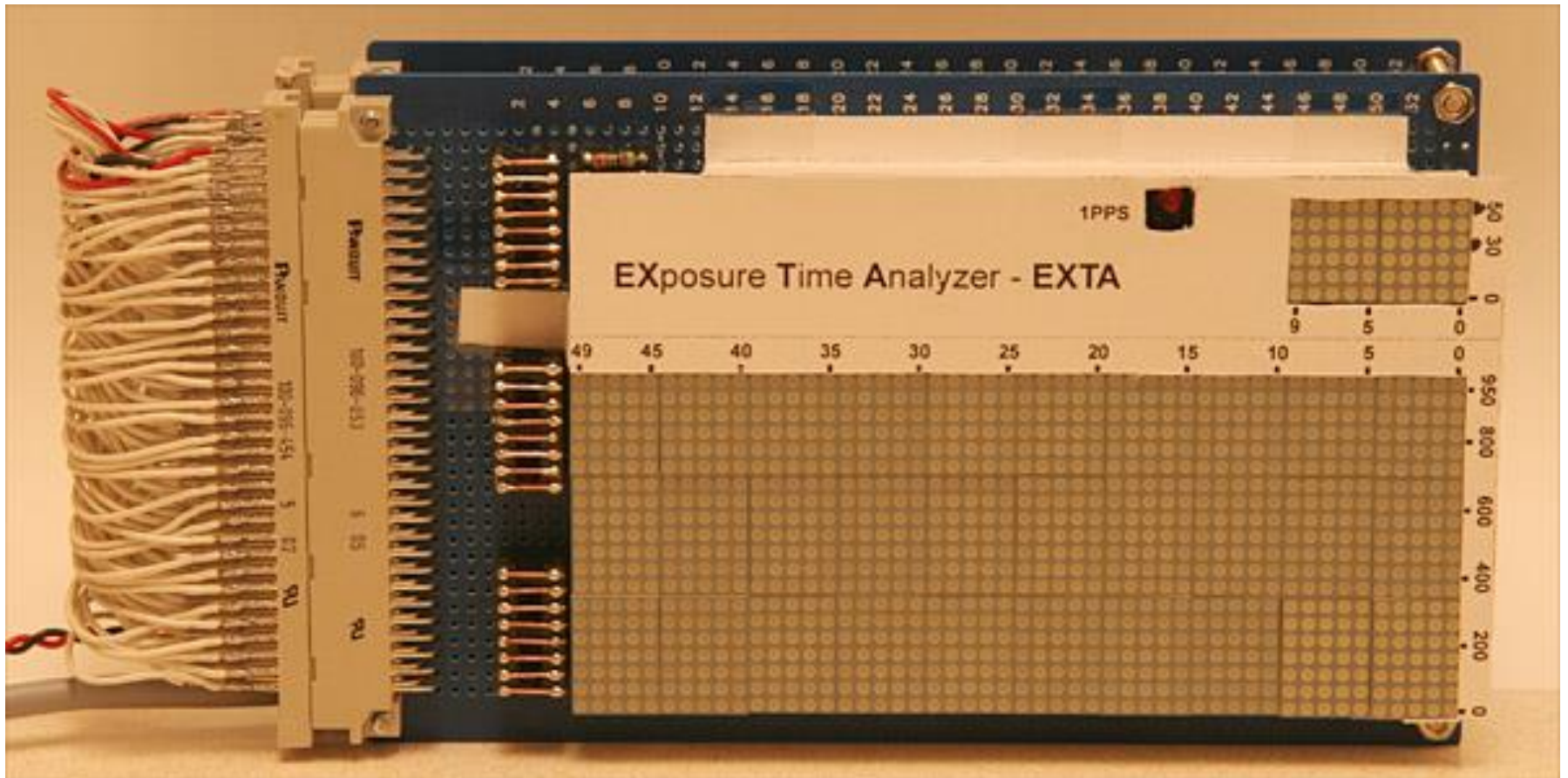
Range 7-12ms / LED step 500 μ s



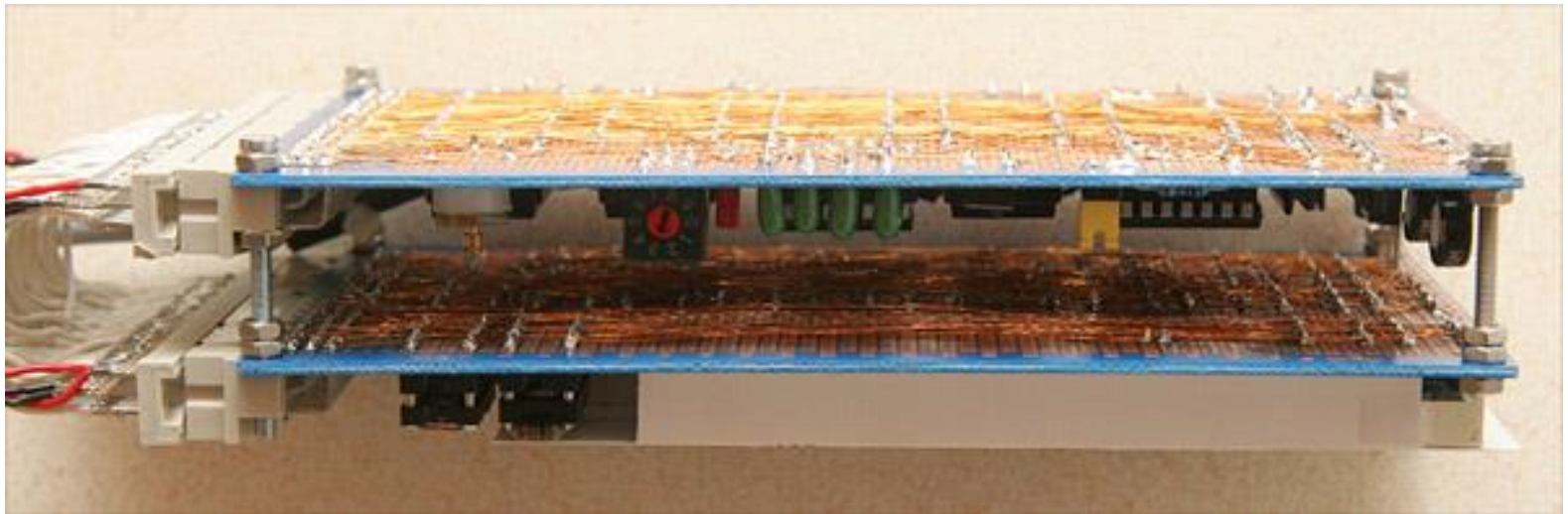
Measurement results

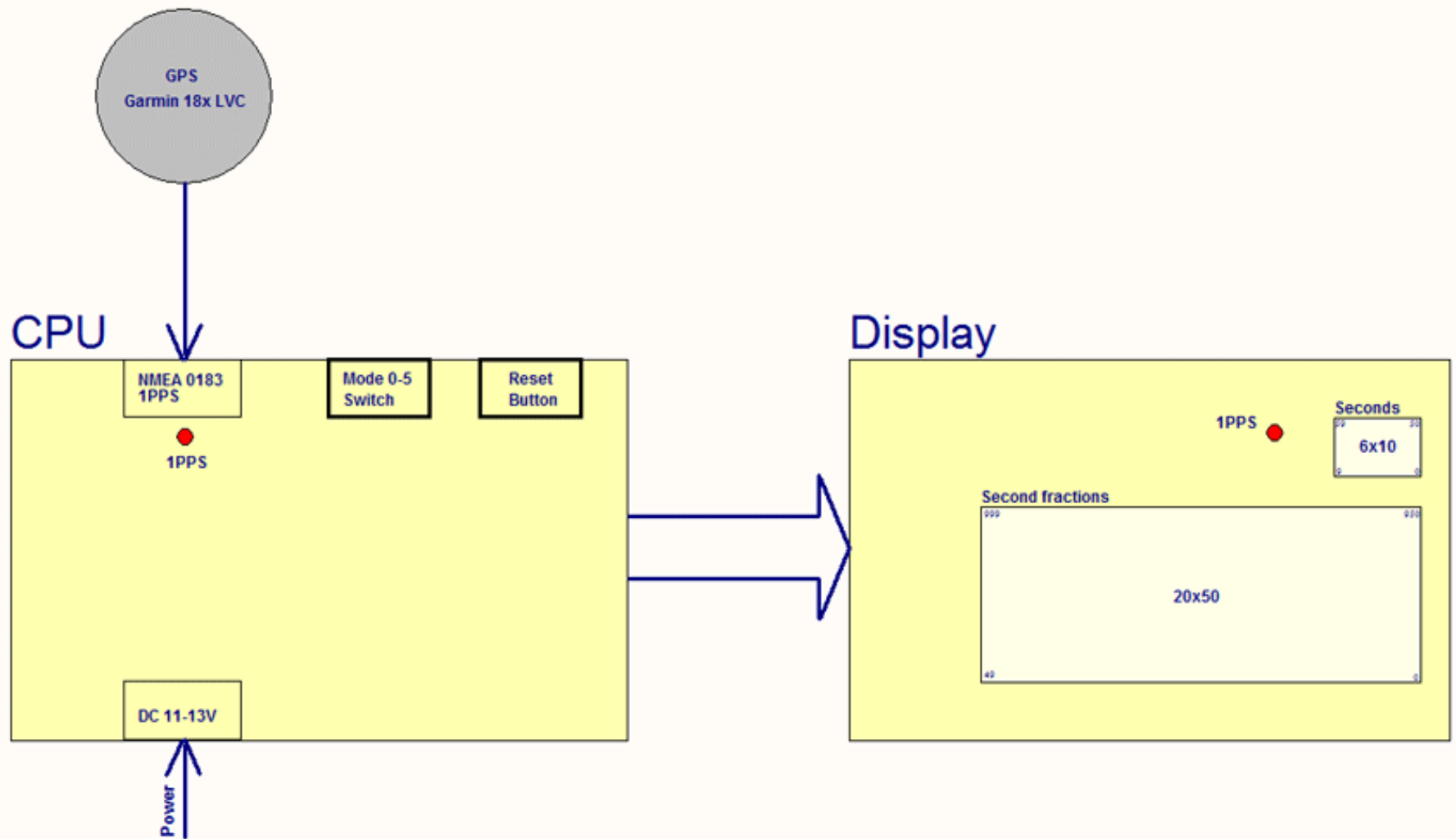
http://www.dangl.at/vexa/vexa_g.htm

EXposure Time Analyzer - EXTA



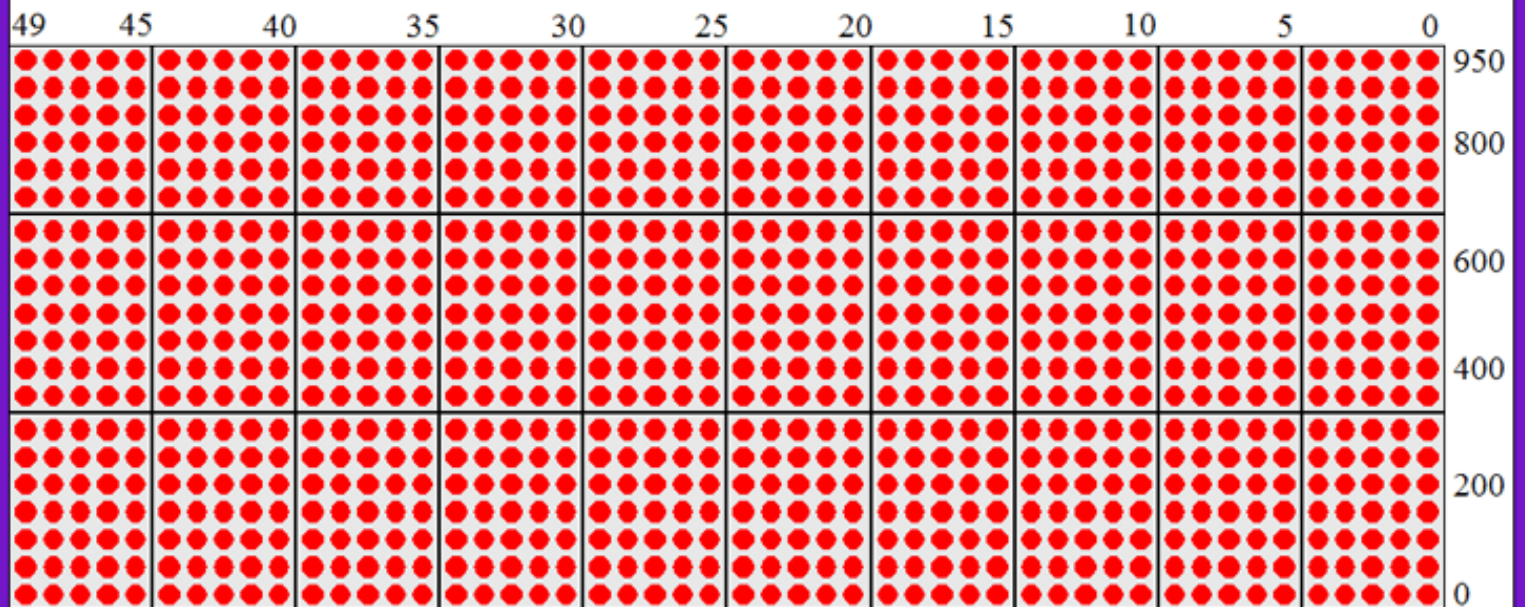
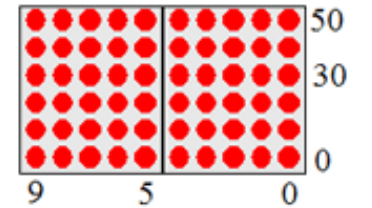
EXposure Time Analyzer - EXTA



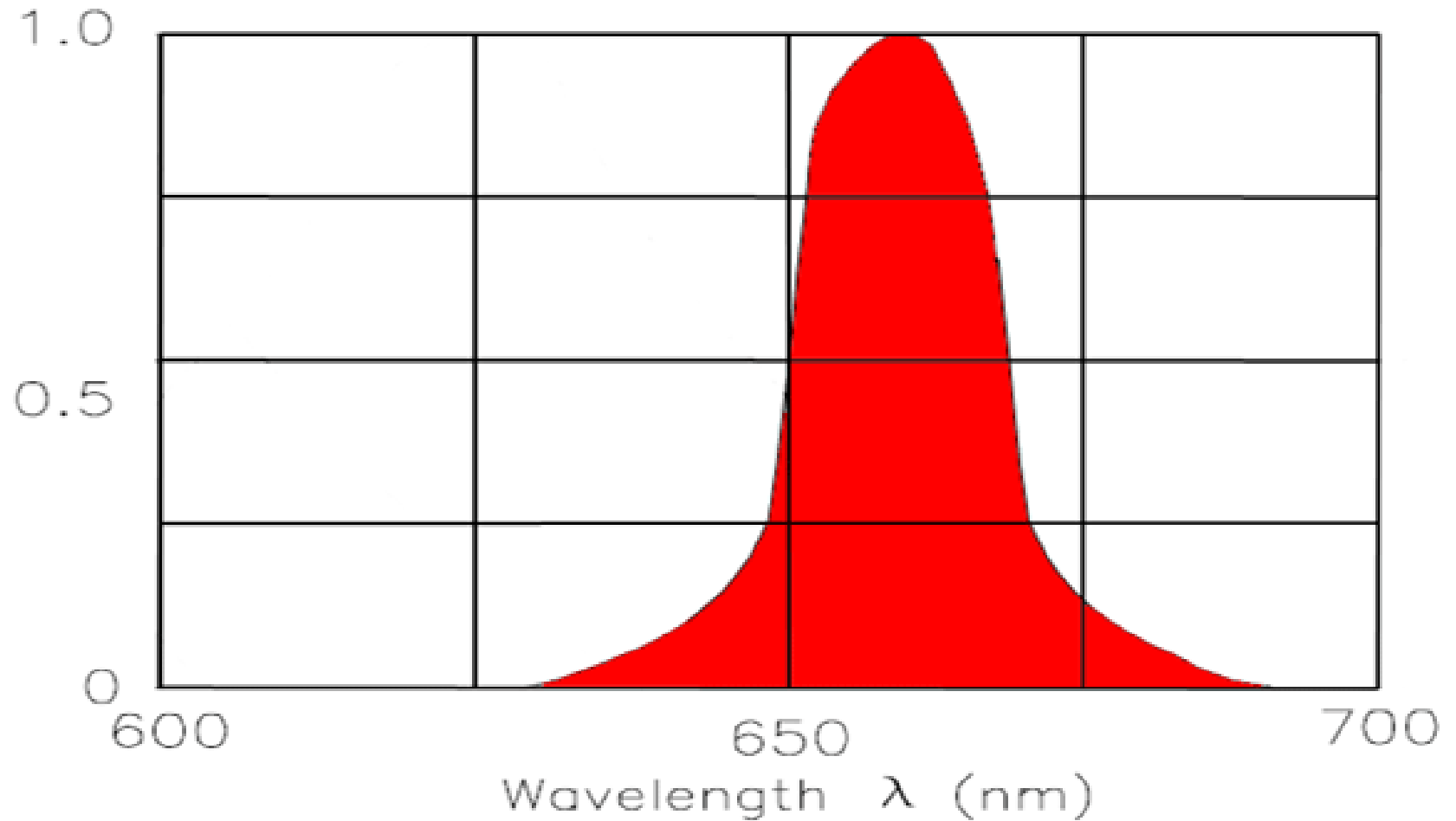


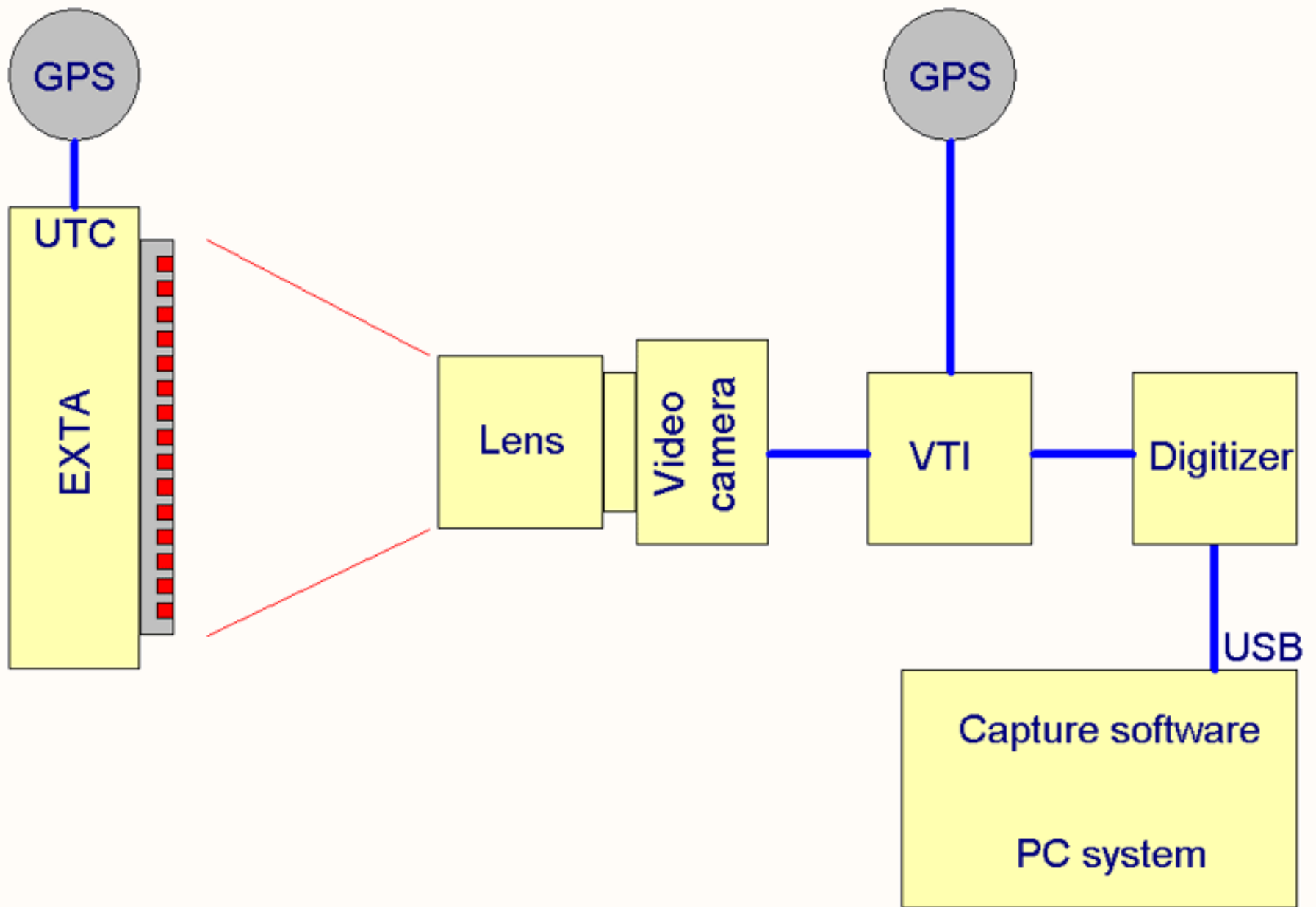
EXposure Time Analyzer - EXTA

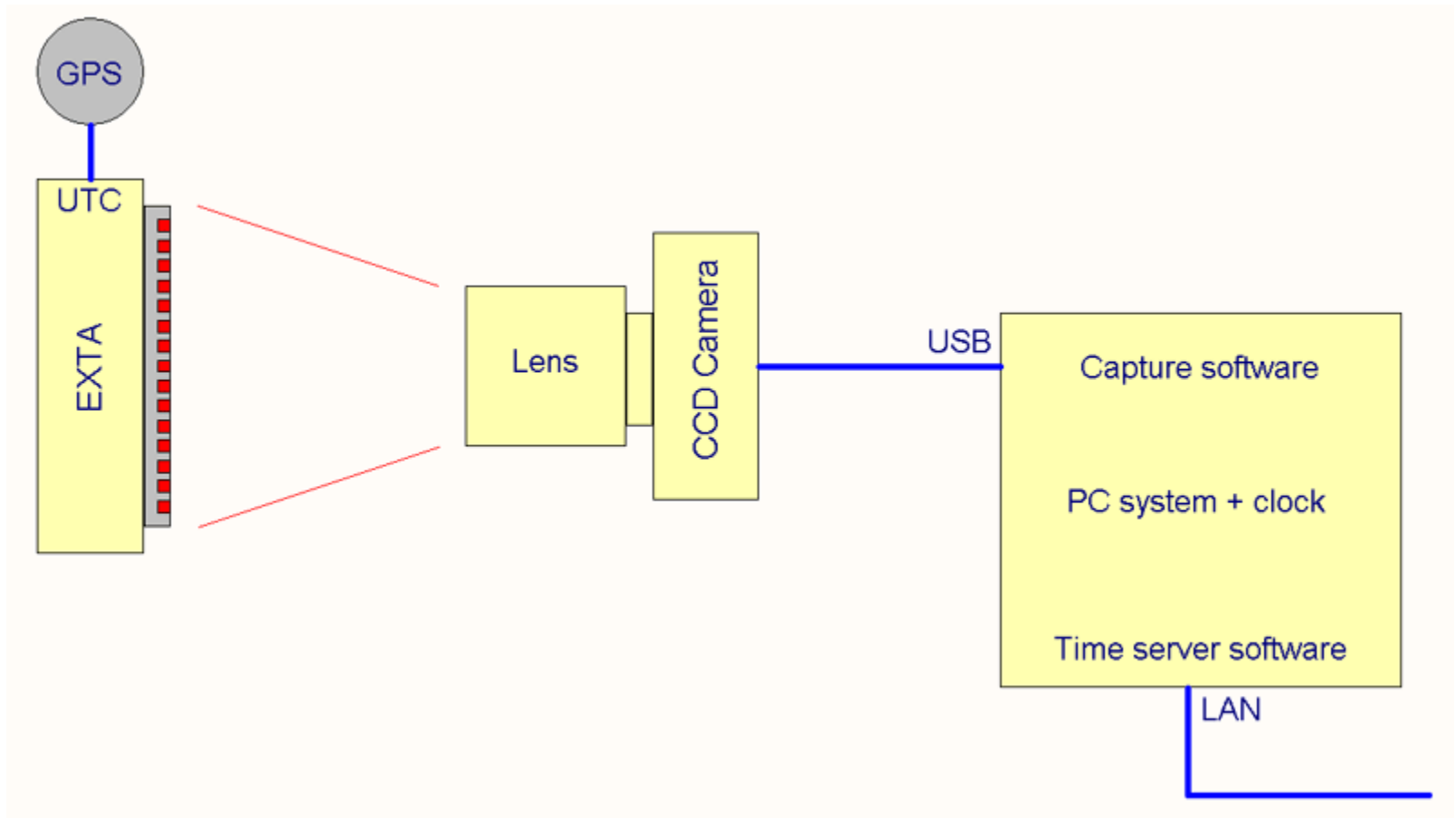
1PPS



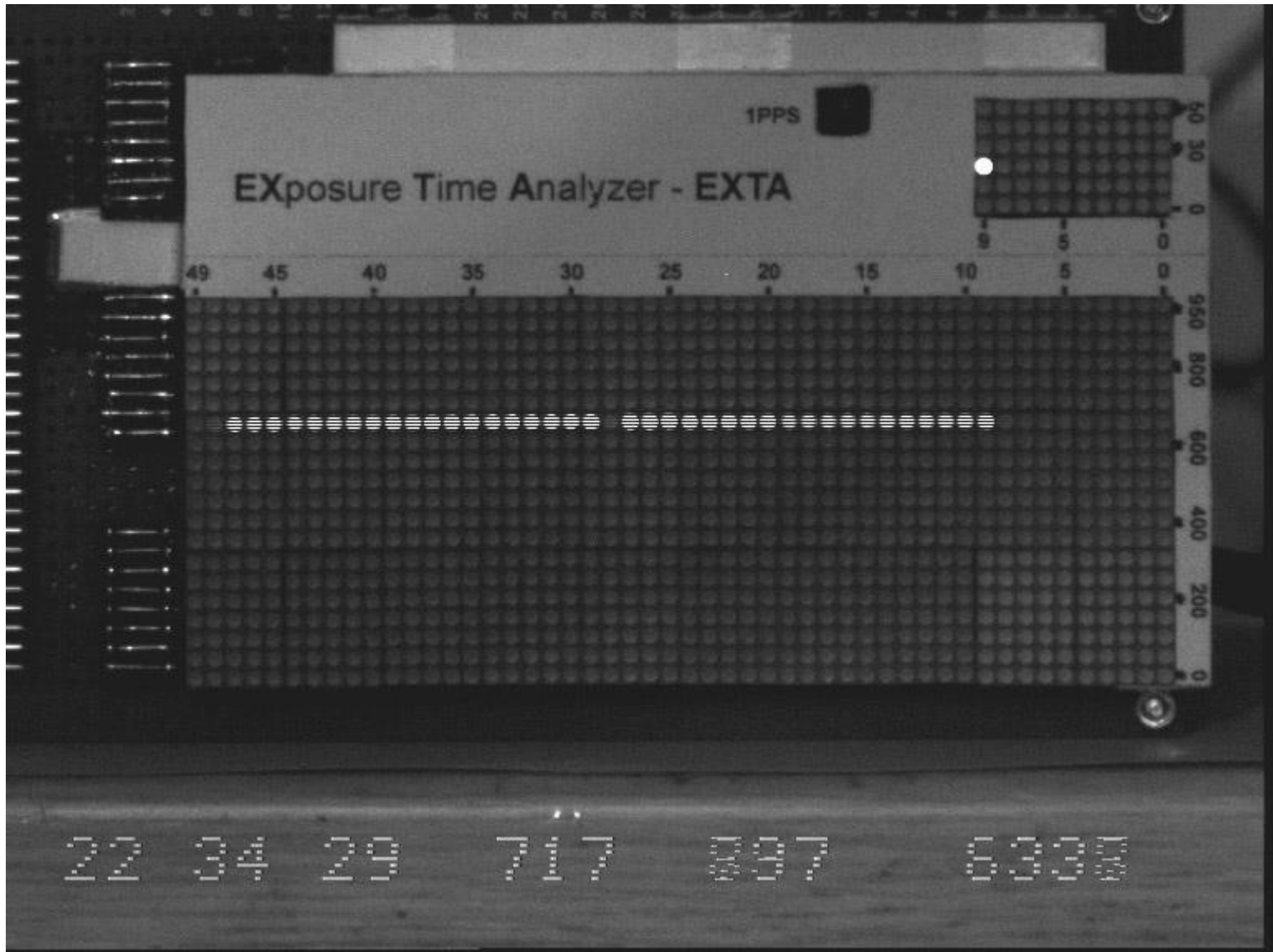
LED matrix wavelength







WAT-120N in mode OFF LED step 1ms



WAT-120N in mode OFF LED step 1ms

Field #6336 real exposure 29.658 - 29.678, field #6337 real exposure 29.678 - 29.698

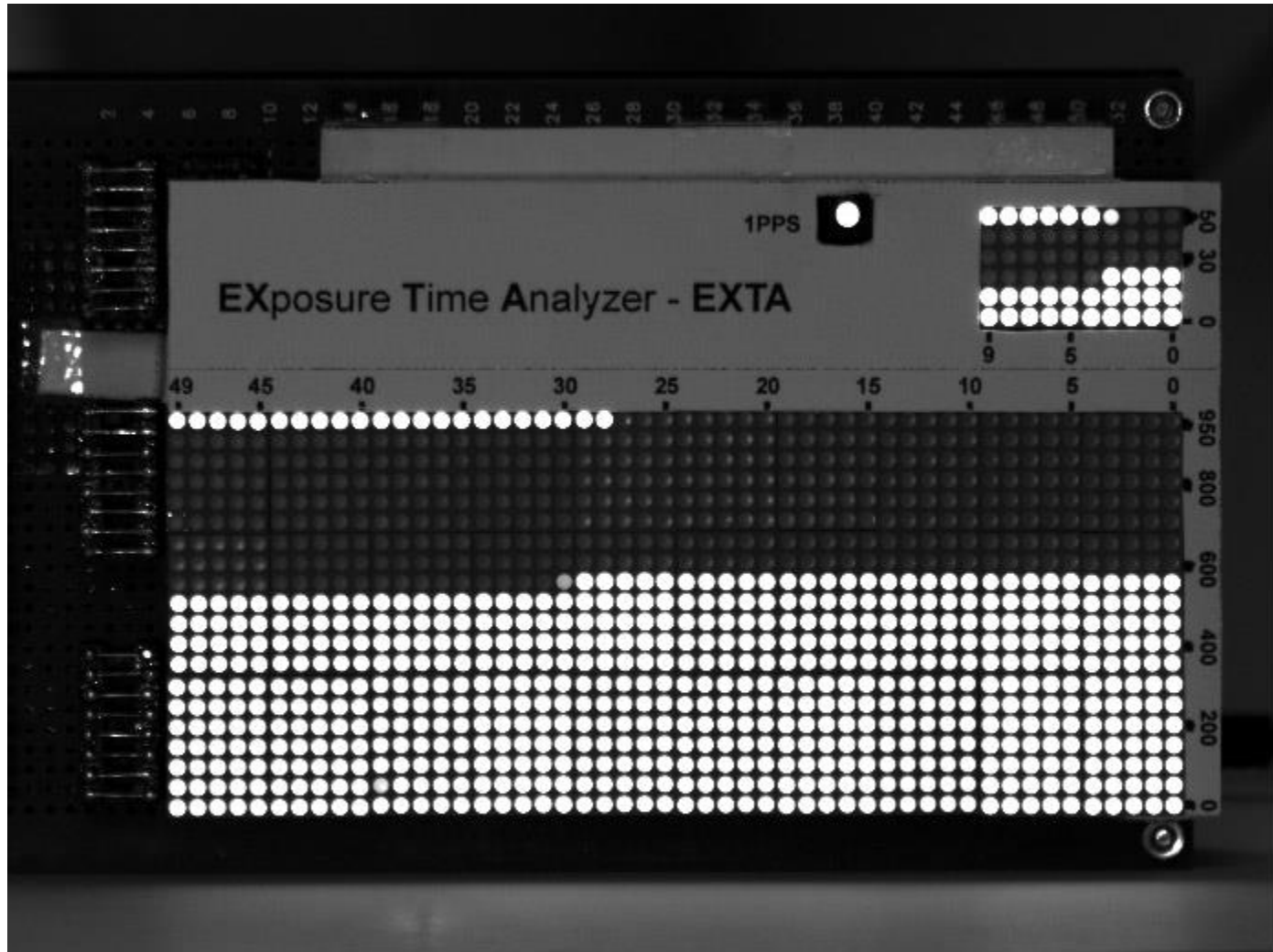


Atik 314L+ set to 30s exposure

LED step 50ms

FITS header time = 21:06:53.9 UTC

Real exposure time = 21:06:53.90 - 21:07:24.00 UTC (Duration 30.100s)

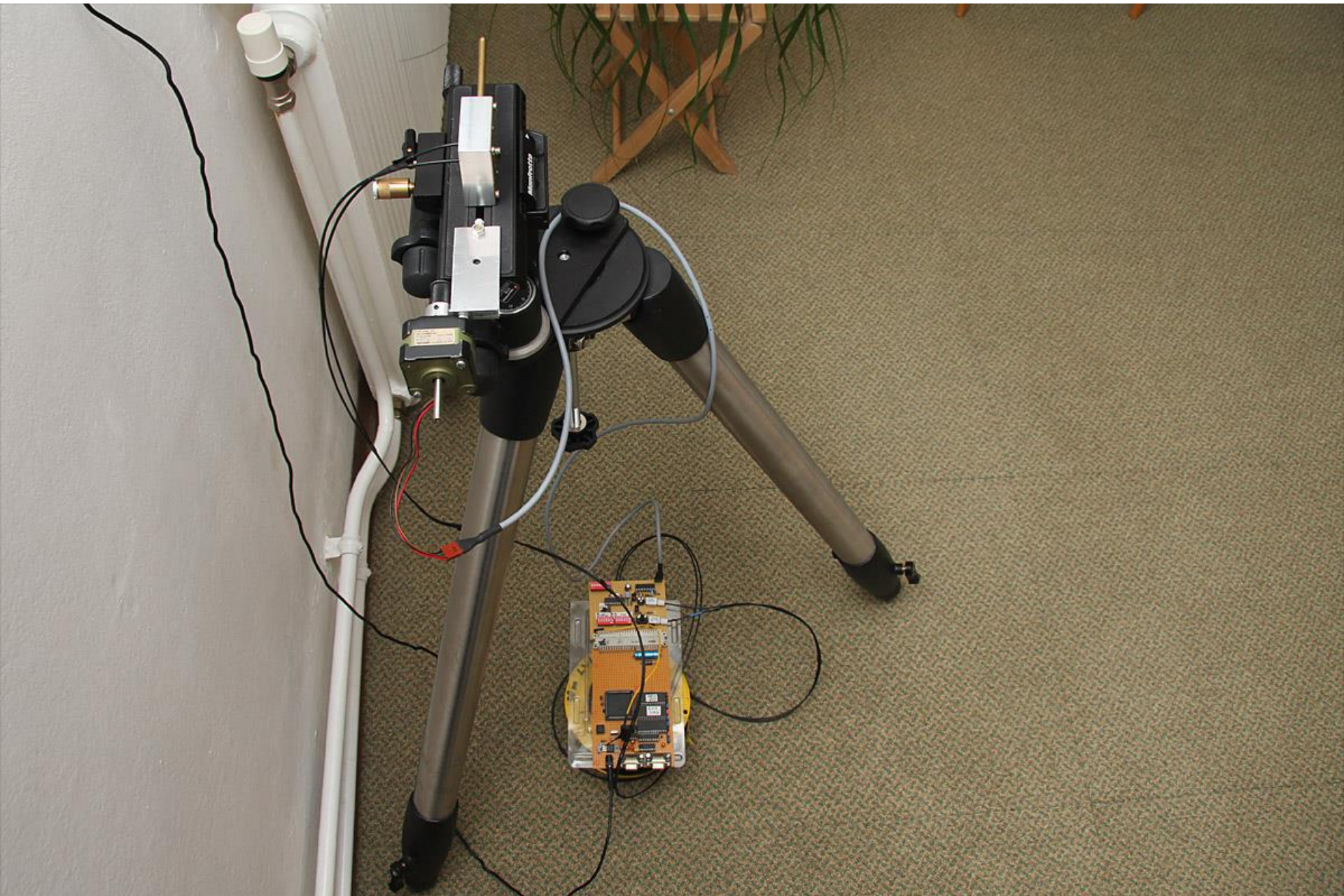


Measurement results

http://www.dangl.at/ausruest/vid_tim/vid_tim1.htm

http://www.dangl.at/exta/exta_e.htm

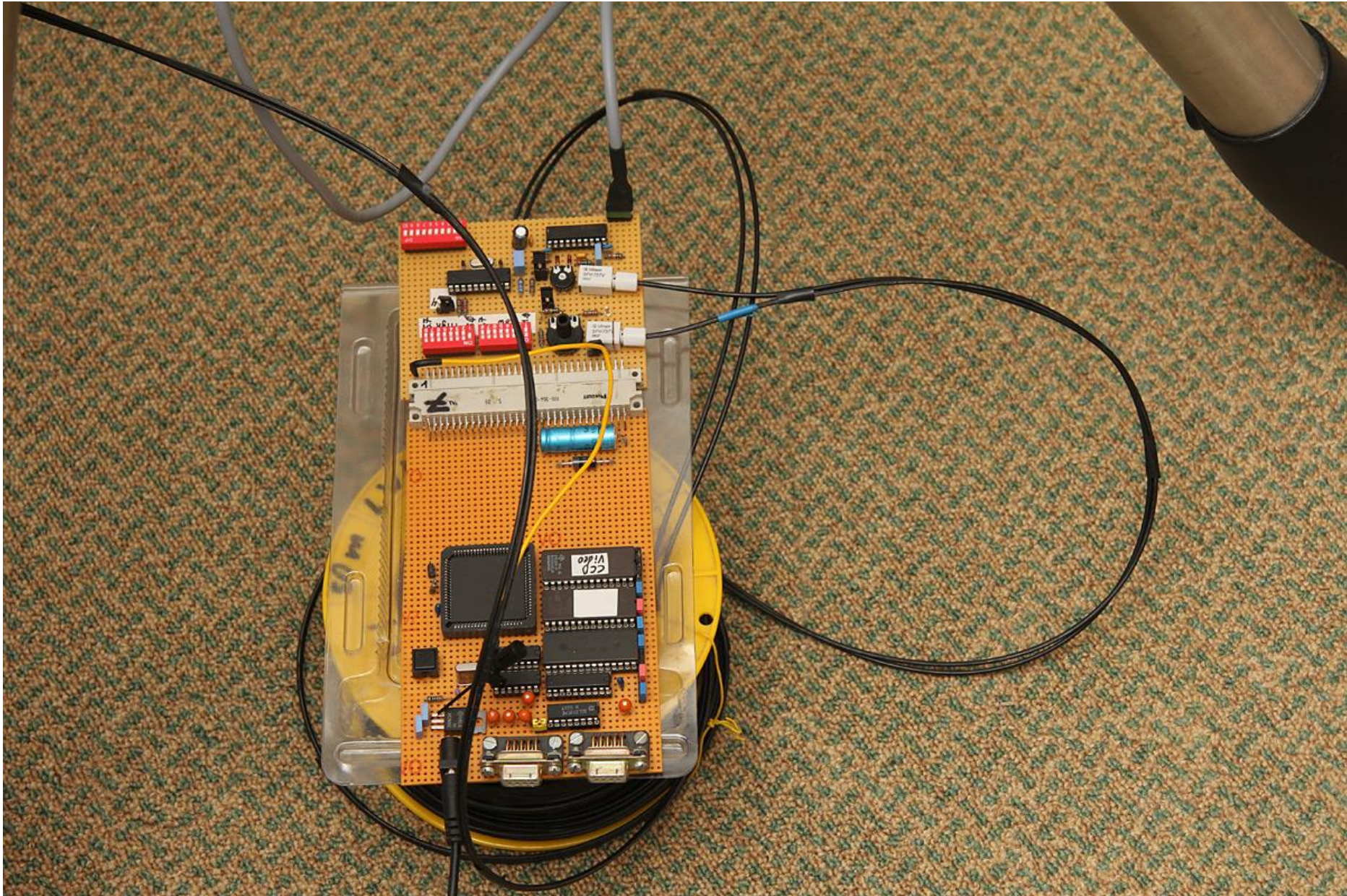
Digital Artificial Star CONTROL - DASCO



DASCO – slider and star box



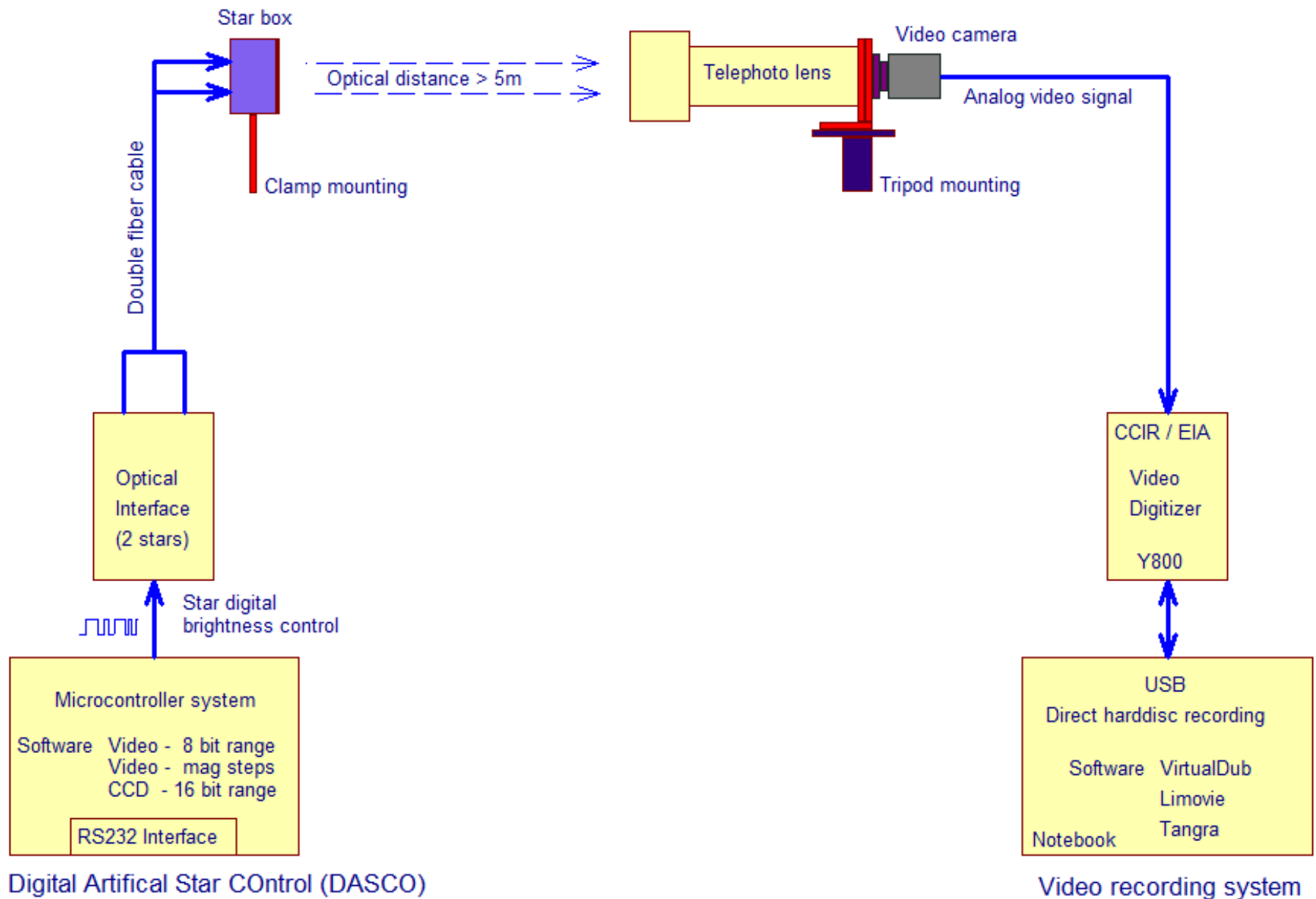
A custom-built electronic circuit board is mounted on a yellow breadboard. The board features several integrated circuits, including a large black chip labeled 'VCC' and '050', and a smaller black chip labeled '1'. There are also red capacitors, a blue electrolytic capacitor, and various other electronic components. Multiple black and grey cables are plugged into the board, including a thick black cable and several thinner black cables. The breadboard is resting on a green and yellow patterned surface.



Video camera testing assembly



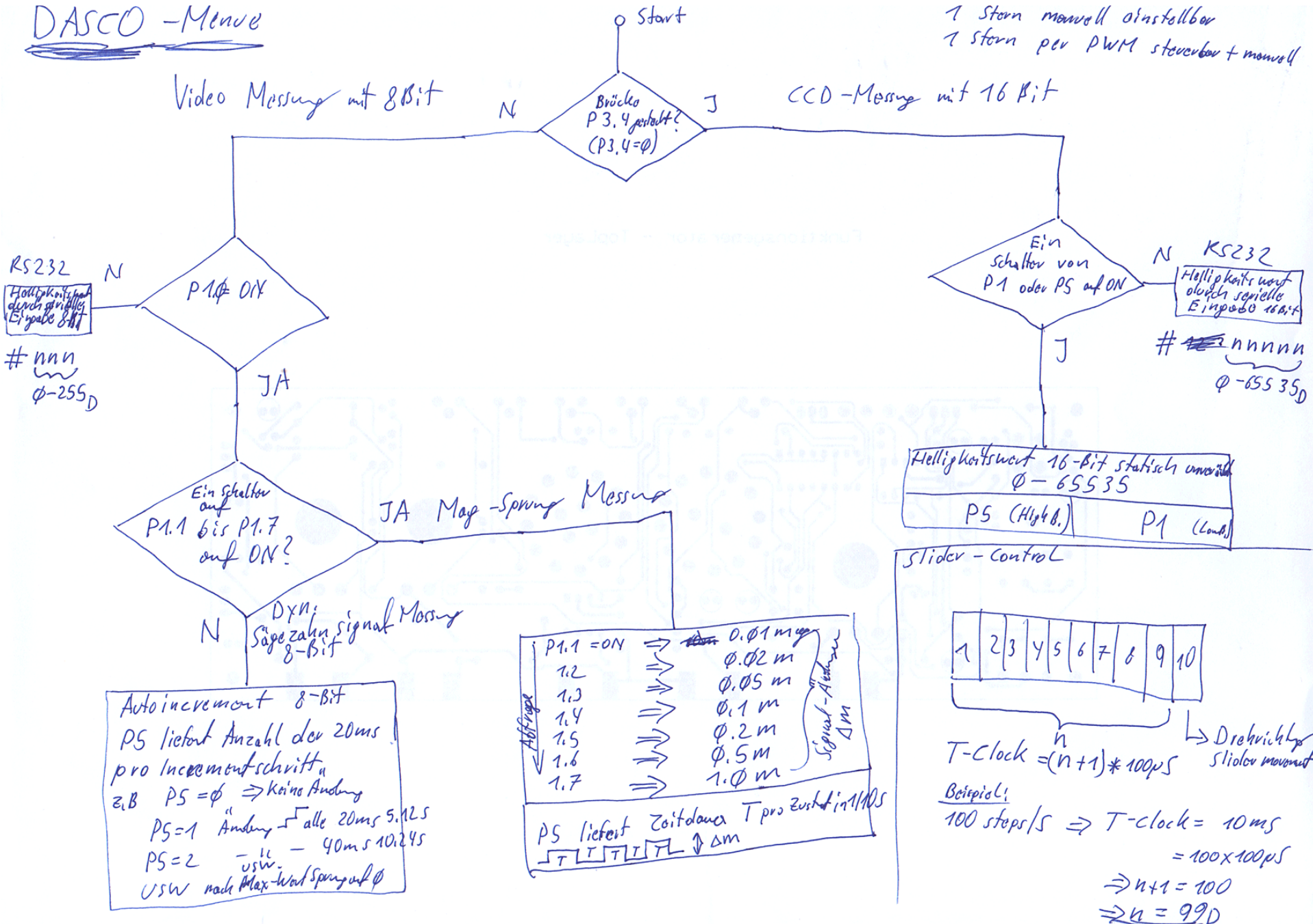
Video camera linearity and sensitivity measurement setup



DASCO - Menue

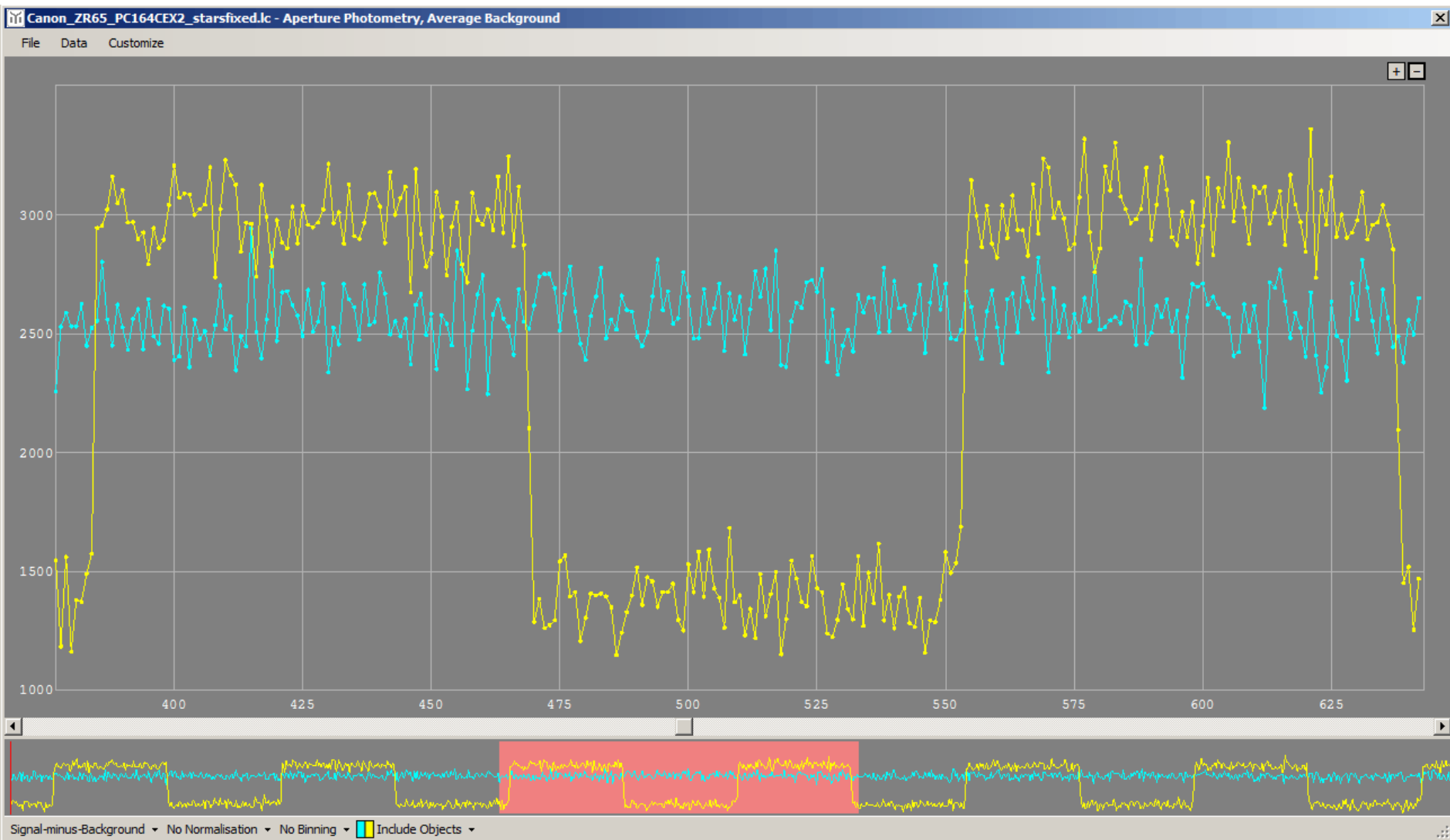
DASCO - Menue

1 Stern manuell einstellbar
1 Stern per PWM steuerbar + manuell



PC164C-EX2 star fixed step 1m0

Canon ZR65



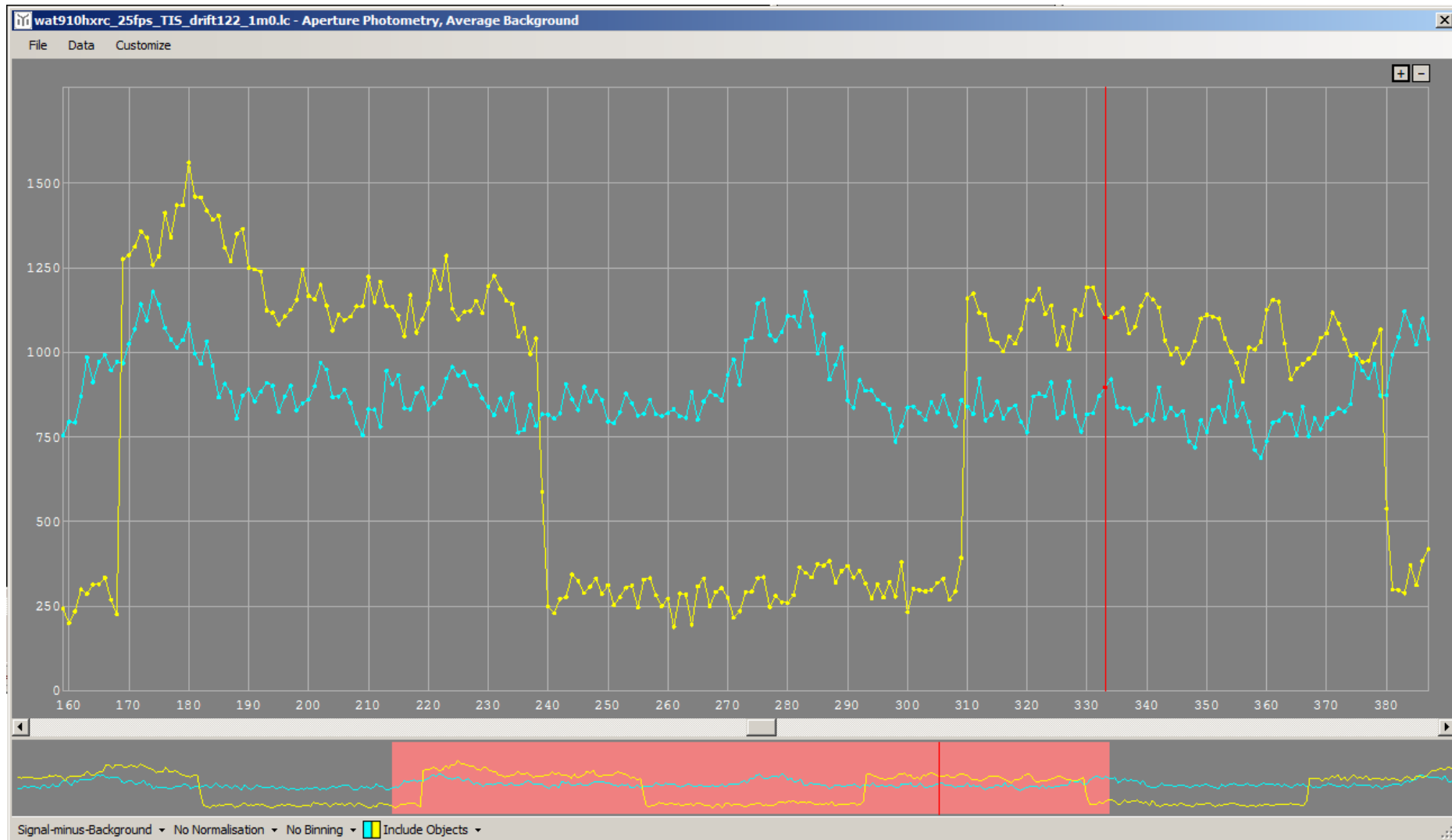
PC164C-EX2 stardrift horizontal step 1m0

Canon ZR65



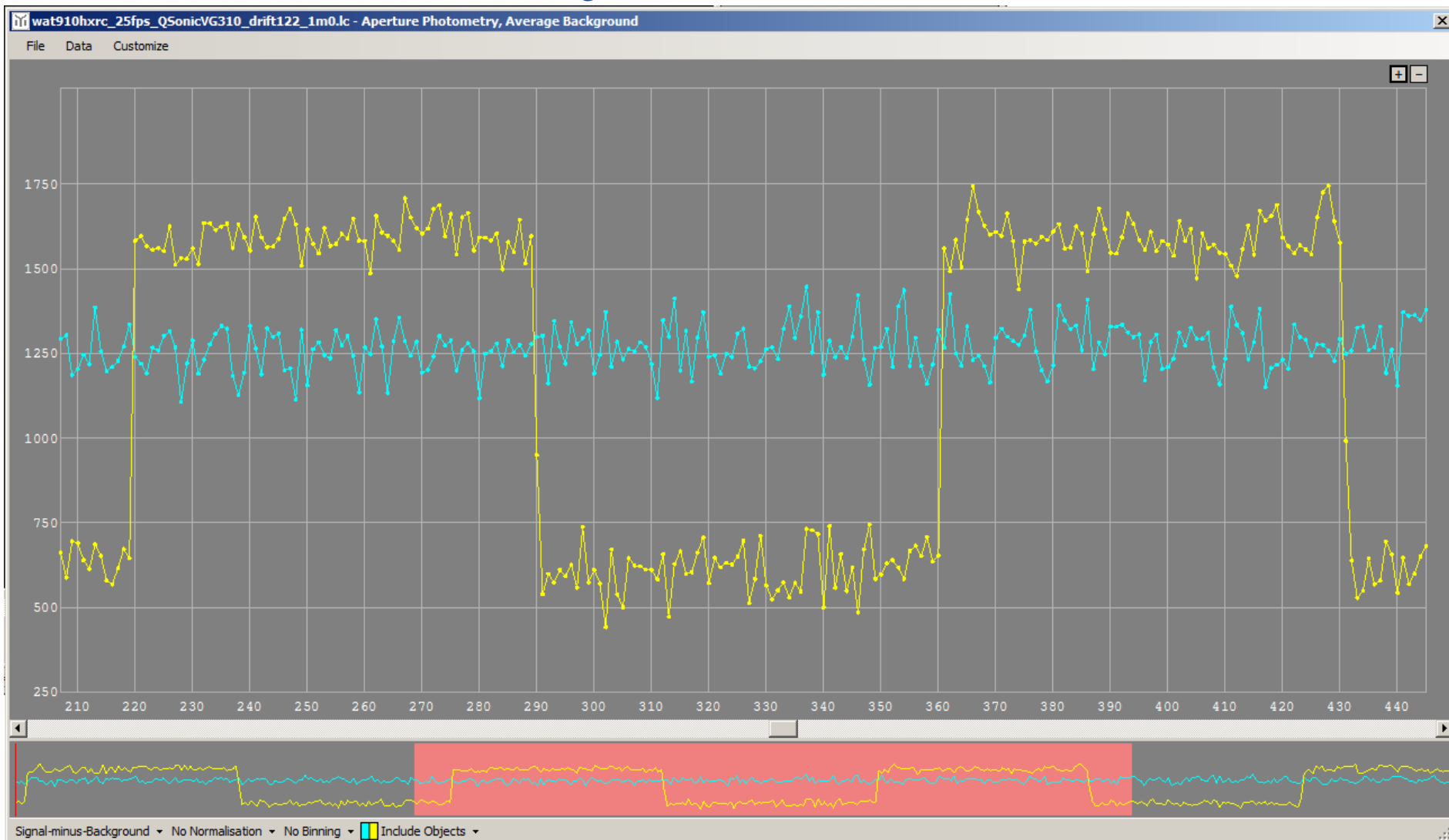
WAT-910HX/RC stardrift horizontal step 1m0

The Imaging Source

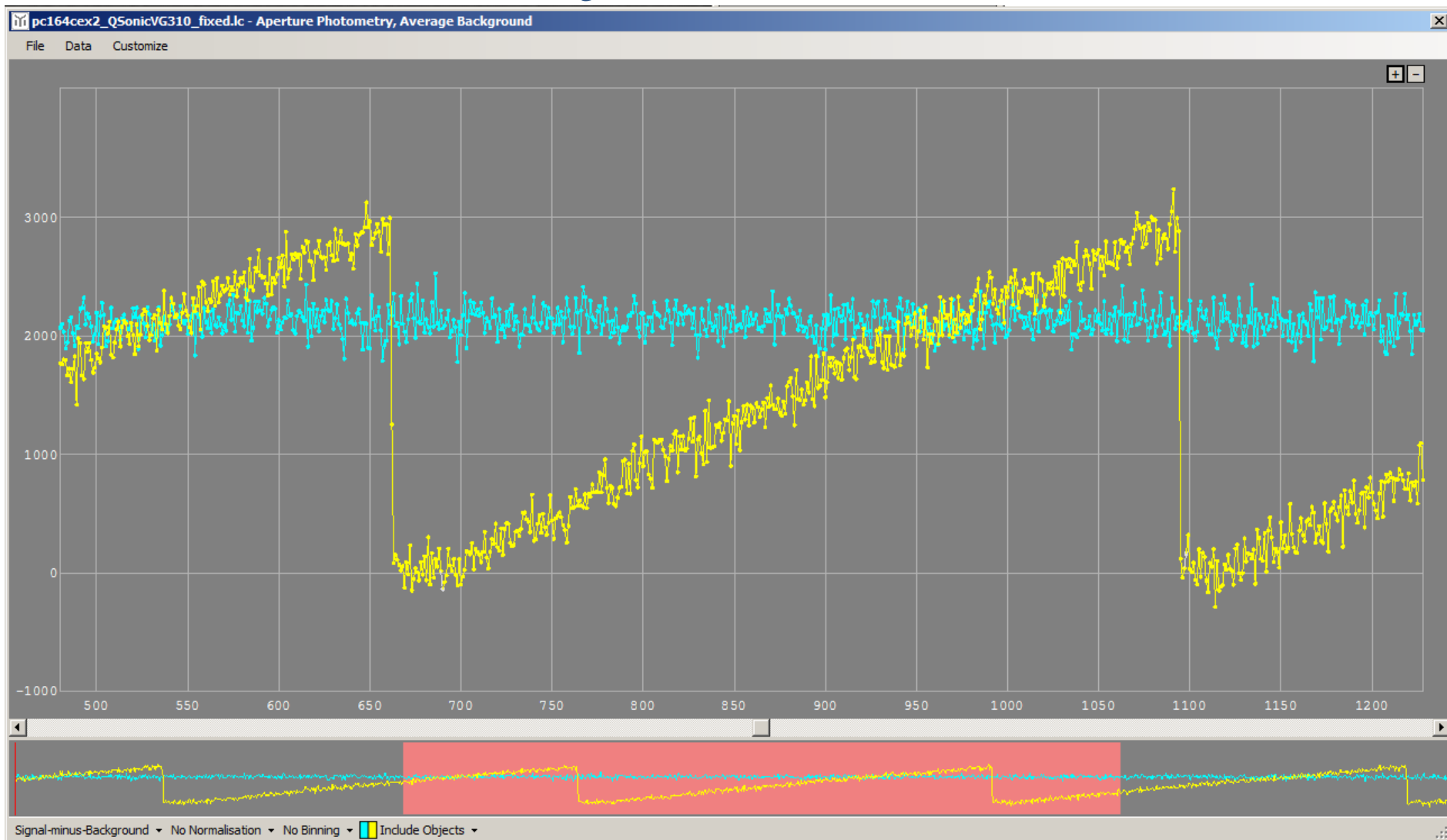


WAT-910HX/RC stardrift horizontal step 1m0

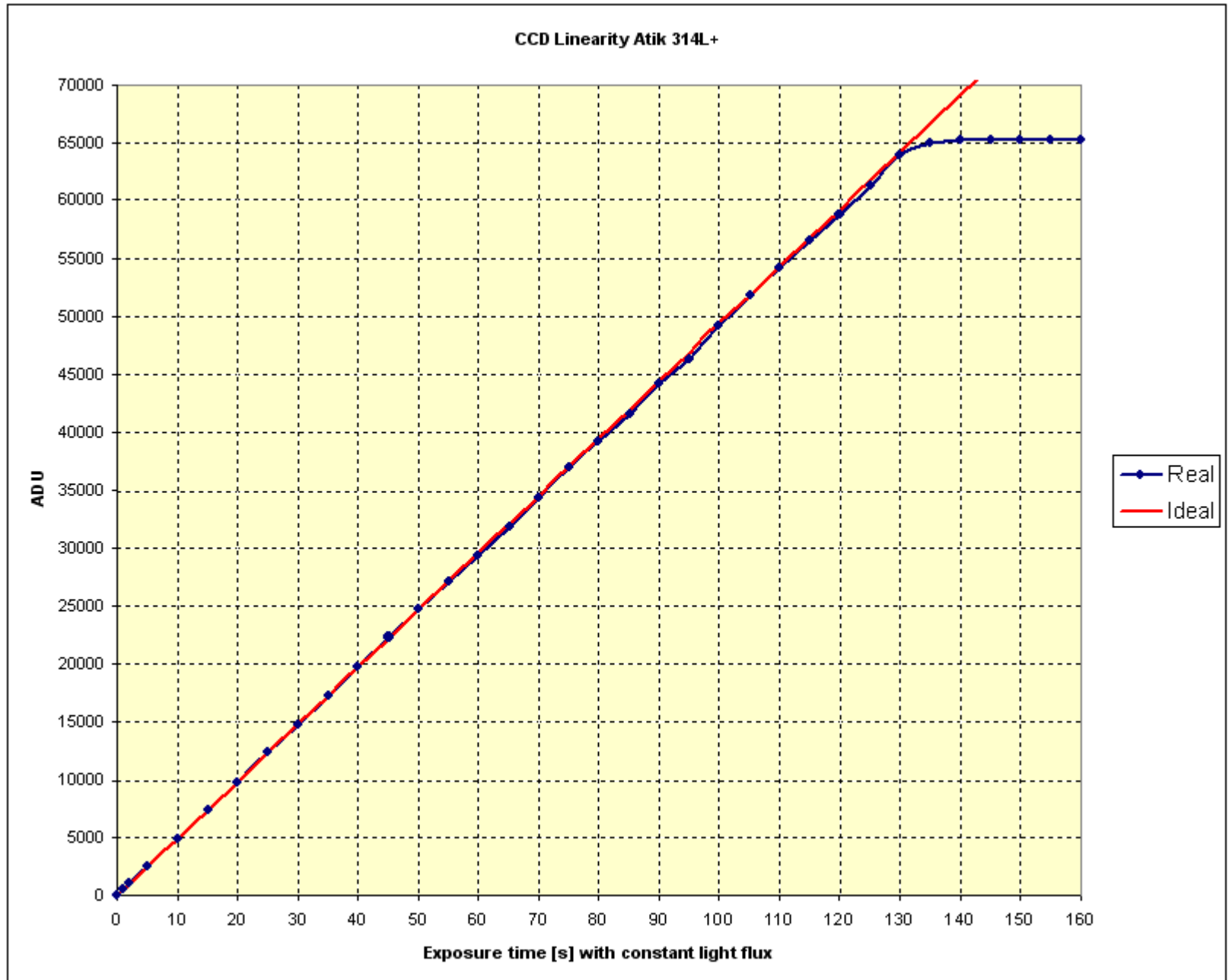
QSonc VG310



PC164C-EX2 star fixed 8-bit dynamic range QSonics VG310



CCD linearity Atik 314L+



Thank you for your attention!