Appendix 9 – Programming and Setting the Function Generator

A9-1 The Function Generator

A Tektronix AFG310 arbitrary function generator set-up as shown in Figure A9-1 is used to generate trigger signals for the Redlake ES1.0 camera by delaying the laser front panel sync out trigger signal.

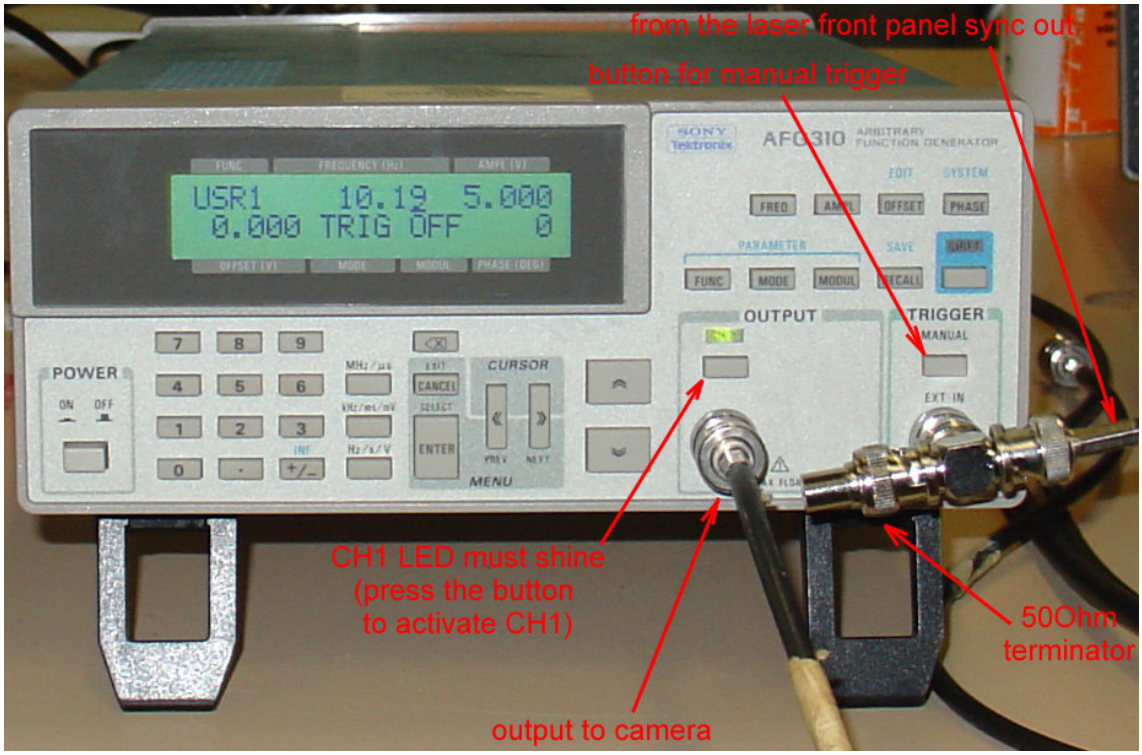

Figure A9-1 Function generator as used to trigger the camera.

Among the tricky and useful things to know are:

- The manual trigger button which allows to trigger the camera manually (excellent for testing without the laser running).
- CH1 must be activated (LED shining) for the waveform to be generated.
  → Press the button beneath the CH1 LED to activate the waveform (bright LED).

A9-2 Setting the Waveform and Frequency

This guide assumes that the laser Q-switch trigger is running at 10Hz and that the appropriate waveform (Chapter A9-3) has been programmed to User1. A summary of the necessary settings is shown in Table A9-1.

[FUNC] USR1	[FREQUENCY (Hz)][1] 10.19		[AMPL (V)] 5.000
[OFFSET (V)] 0.000	[MODE] TRIG	[MODUL] Off	[PHASE (DEG)] 0

Table A9-1 Function Generator Settings

1) Turn on the frequency generator.
2) Set the waveform function to User 1:
   → Press [FUNC]; use the up and down arrows [˄] [˅] to select "USR1";
   → Press [ENTER].
3) Set the frequency to 10.19 Hz by:
   → Press [FREQ];
   → Press [Hz/s/V];
   → Set to "10.19" by using the keypad and press [ENTER].
4) Set the amplitude to 5V (TTL high level):
   → Press [AMPL];
   → Set to "5.000" by using the keypad and press [ENTER]
5) Check if offset is zero, if not:
   → Press [OFFSET]; set to "0.000" as above.
6) Set to triggered mode
   → Press [MODE];
   → Set to "TRIG" by using the up and down buttons [˄] [˅];
   → Press [ENTER].
7) Make sure that MODUL is OFF and that the PHASE is 0
   → If not correct in similar fashion as above.
8) Press CH1 (green light must appear) for operation!!!

1 It might become necessary to change the frequency should any laser timing settings change. In this case the trigger signal delay has to be measured again (using an oscilloscope and a fast photodiode).

A9-3 Programming the Waveform

The following guide shows how to program the waveform shown in Figure A9-2 (used to trigger the camera).

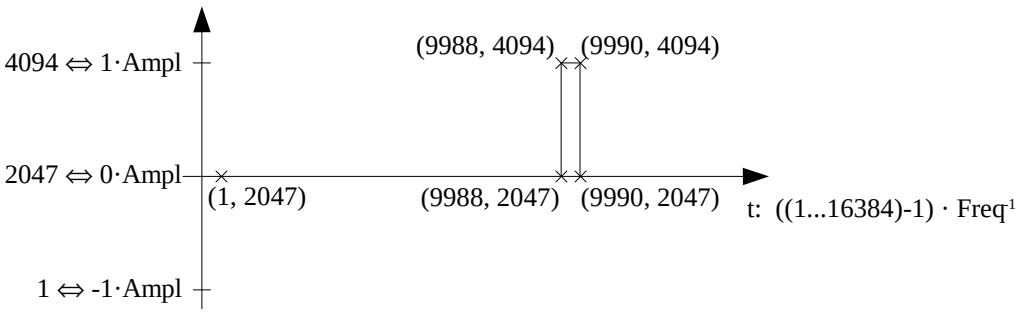

Figure A9-2 Waveform as programmed.

1) Set the waveform function to Edit:
   → Press [FUNC]; use the up and down arrows [˄] [˅] to select "EDIT";
   → Press [ENTER].
2) Set the desired number of points:
   → Press [SHIFT], [EDIT] (same button as offset, blue letters);
   → Select 'NUM OF POINTS' by using the left and right buttons [«] [»];
   → Press [ENTER];
   → set value to "9990" by pressing [9], [9], [9], [0], and [ENTER]
3) Draw the waveform
   {lines between points (1,2047) (9988,2047) (9988,4094) (9990,4094)}
   → Press [CANCEL] to move the cursor to 'NUM OF POINTS' again;
   → Use [«] and [»] to select 'LINE';
   → Press [ENTER];
   → Type [1], [ENTER];
   → Type [2], [0], [4], [7], [ENTER] → (1,2047)
   → Repeat for (9988, 2047)
   (i.e. type [9], [9], [8], [8], [ENTER]; type [2], [0], [4], [7], [ENTER]);
   → and (9988,4094), and (9990,4094).

4) Save the waveform to USR1:
   → Press [CANCEL] to move the cursor to 'LINE' again;
   → Use the left and right buttons [«] [»] to select 'SAVE TO';
   → Press [ENTER], select 'USER1' by using the up and down buttons [˄] [˅]
   → Press [ENTER] (this can take a short while).
5) Done!
   → Press [CANCEL] (twice or until beeps occur) to get back to the main menu;
   → And set up the parameters (frequency, ... → Chapter A9-2).