

# Bitscope Micro tips (DSO)

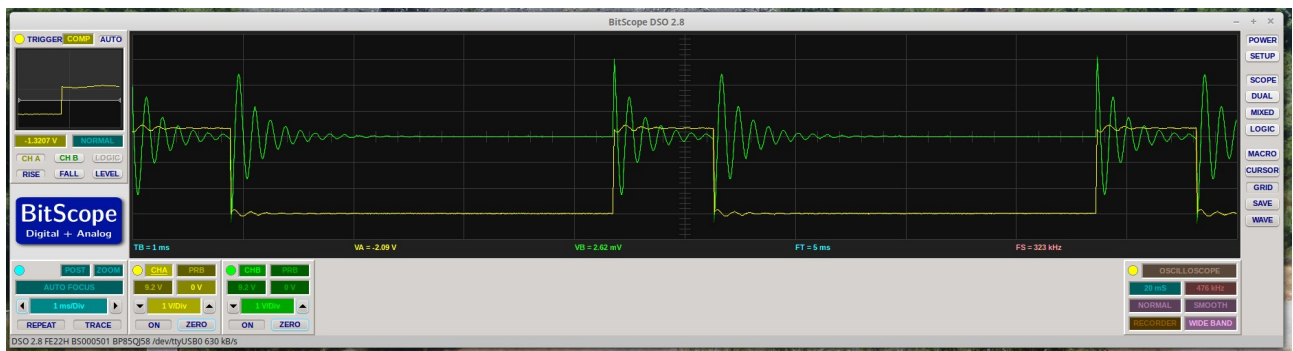
## Understand Act On Touch Parameter settings

Parameters can be set by

- left clicking in a field and dragging up and down (continuous variation)
- right clicking and selecting from a menu

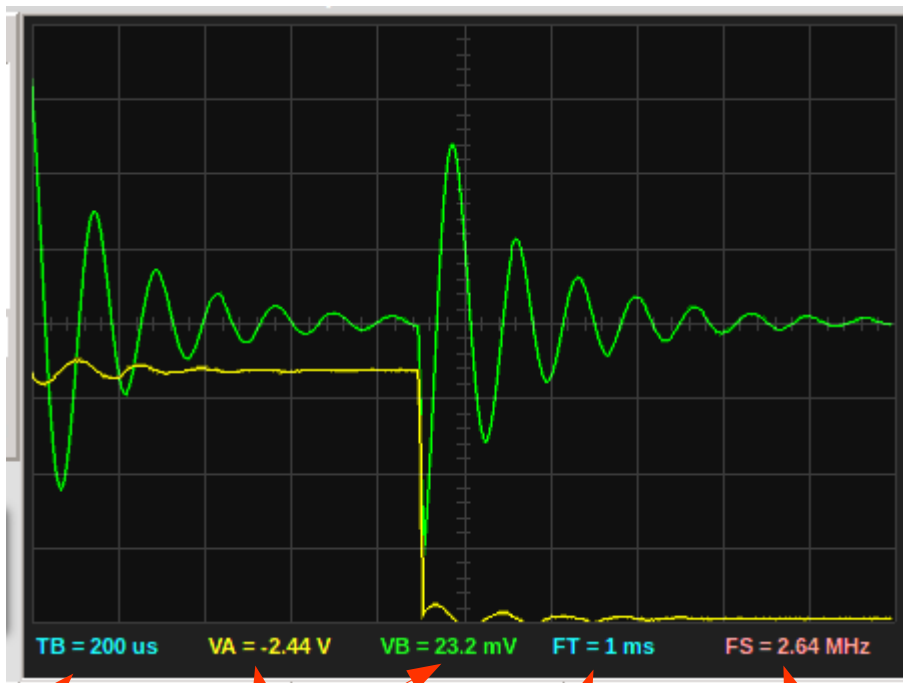
The trigger level and the cursors can be set by dragging

See more of your curves by widening the display window:



Use zoom for the same purpose.

## The scope window



Time base  
= time / div  
200us / div

Measured DC or bias  
voltage  
This is weird!


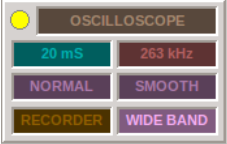
Focus time  
= time at the display  
center relative to  
trigger point

Sampling frequency  
(Sample Rate)

What does VA, VB exactly mean? As described in the manual, it is not clear! (See channel settings and

appendix)

**Virtual instruments and Display Format Menu**

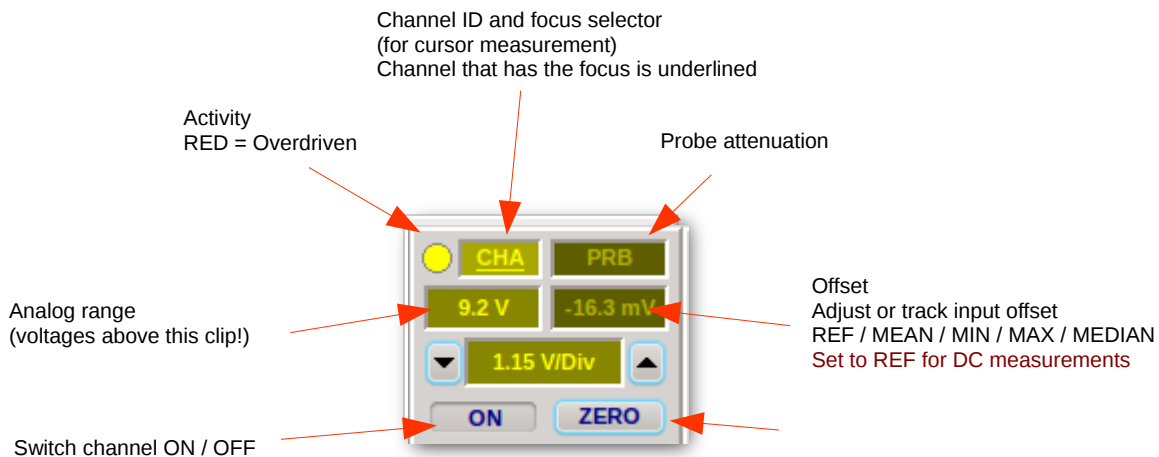
	<p><b><u>Virtual instruments</u></b></p> <p>The dual scope window is selected with the SCOPE button on the right, or the DUAL button.</p> <p>SCOPE: multiple channel oscilloscope          DUAL: 2 channel sample linked oscilloscope</p> <p><b>Does this make any difference for the Bitscope micro?</b></p> <p>SCOPE: 1 channel activated by default, you have to activate the other one manually.          DUAL: 2 channels activated by default.          The VECTORSCOPE function is only available for DUAL.</p> <p>Other possibilities:          MIXED: 2 analog channels, 6 digital channels displayed simultaneously          LOGIC: 8 channel logic analyser</p> <p>The spectrum analyzer would be expected here, but it is found in the Capture control window.</p>
	<p><b><u>Display format menu</u></b></p> <p>Right clicking on the FORMAT field (default = OSCILLOSCOPE) gives the other possibilities:</p> <p>MIXED DOMAIN SCOPE = oscilloscope with 2 channel spectrum analyzer          SPECTRUM ANALYZER          VECTORSCOPE          PHASE ANALYZER</p>

For most time domain measurements, DUAL or SCOPE are the right choices.

For logic analysis, choose MIXED or LOGIC

For frequency analysis, choose SPECTRUM ANALYZER or MIXED DOMAIN SCOPE

## The channel settings



- Switch channel ON
- Select voltage / DIV (continuously by dragging in the V/DIV field or from list by right click in the field). The analog range is normally set automatically  
When the activity LED turns red, the channel is overdriven. In this case, set V/DIV and / or offset to other values, or use a 10:1 probe.
- Eventually set probe attenuation (right click)
- Adjust offset to have a nice curve  
The display can track mean / median / min / max for offset or use no offset (REF)

**Use REF for ground referenced measurements** (this corresponds to DC input setting on a classical oscilloscope)

The curve can be moved up and down by changing the offset value (drag with the mouse in the offset field).

**Use MEAN offset to eliminate DC bias from the waveform. This is similar to AC coupling** on a classical oscilloscope.

Use MEDIAN if the signal has a variable mean value, e.g. modulated PWM  
MEDIAN is in the middle between MIN and MAX

The combination of Offset value and ZERO button can be very confusing, especially when the question arises: where is my ground level?

As I think I found out after much experimenting and reading, it works as follows:

### For DC measurements:

- use REF as offset tracking mode (right click, select REF)
- Do not push the ZERO button! Instead, right click on it and do „Reset zero“. This moves the zero line always to the middle of the display.  
Now the offset should read „0V“

If this procedure is not followed, the cursors read false voltage values!

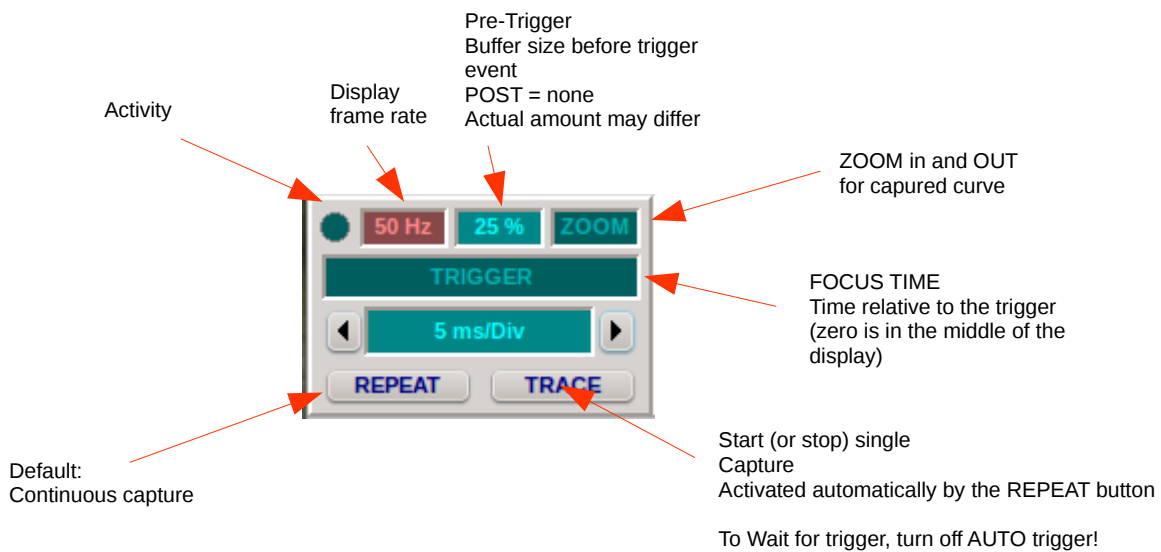
<http://www.bitscope.com/software/blog/DJ/?p=DJ19A>

[Zero Set Function](#)

<https://trello.com/c/7Q6Wz4OY/17-input-offsets-coupling>

It is not clear to me if this strange behavior is a software bug or a misunderstood special feature.

## Timebase settings

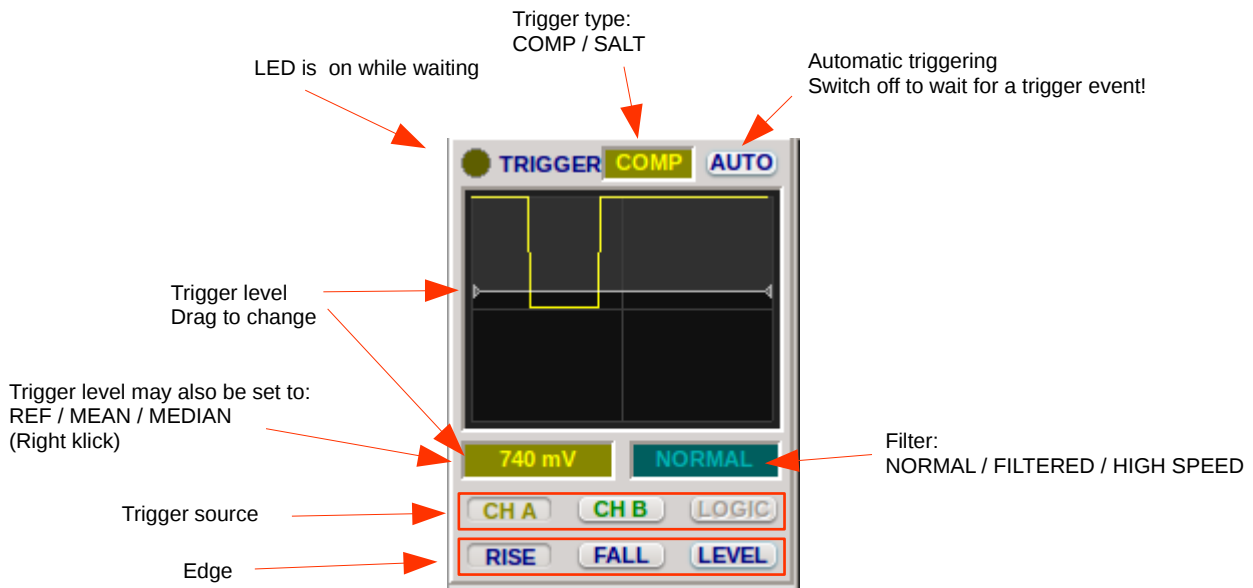


- Timebase in s/DIV implicitly sets the frame rate.
- **The display normally only shows a part of the captured waveform!**  
**Use ZOOM and FOCUS TIME settings to see more of it!**  
Don't forget the Act on Touch philosophy. By clicking and dragging these settings can be adjusted continuously

## Repeat and single shot mode

- **For periodic signals use REPEAT** (this automatically activates TRACE), **and AUTO trigger.**  
This gives an automatic update on the screen.  
It is the default at startup
- **For single events, switch off AUTO trigger and REPEAT.**  
Now the oscilloscope waits for a trigger event.

## Trigger control



### Trigger type:

- COMP = Analog Comparator (this is the normal choice)
- SALT = Sample Analog Level Trigger  
A digital comparator uses the sampled signal, useful for AM, FM and other modulated complex signals

The trigger level may be set to a fixed value, or it can be tracked using MEDIAN or MEAN:

- MEAN = similar to AC triggering, regardless of DC bias
- MEDIAN = tracks the signal at mid-point  
Useful for PWM or other highly asymmetric signals, where the mean value changes all the time.

If CURSOR is active, the trigger level may also be set by moving one of the cursors (MARK or POINT). To do this, right click on Cursor level field and select MARK or POINT.

If the signal has glitches the trigger may be too fast. In this case select FILTERED.

The hold-off time is indicated in the FILTER field, and it may be adjusted by clicking and dragging.

In mixed mode (display analog and logic signals) you can trigger on analog or logic signals.

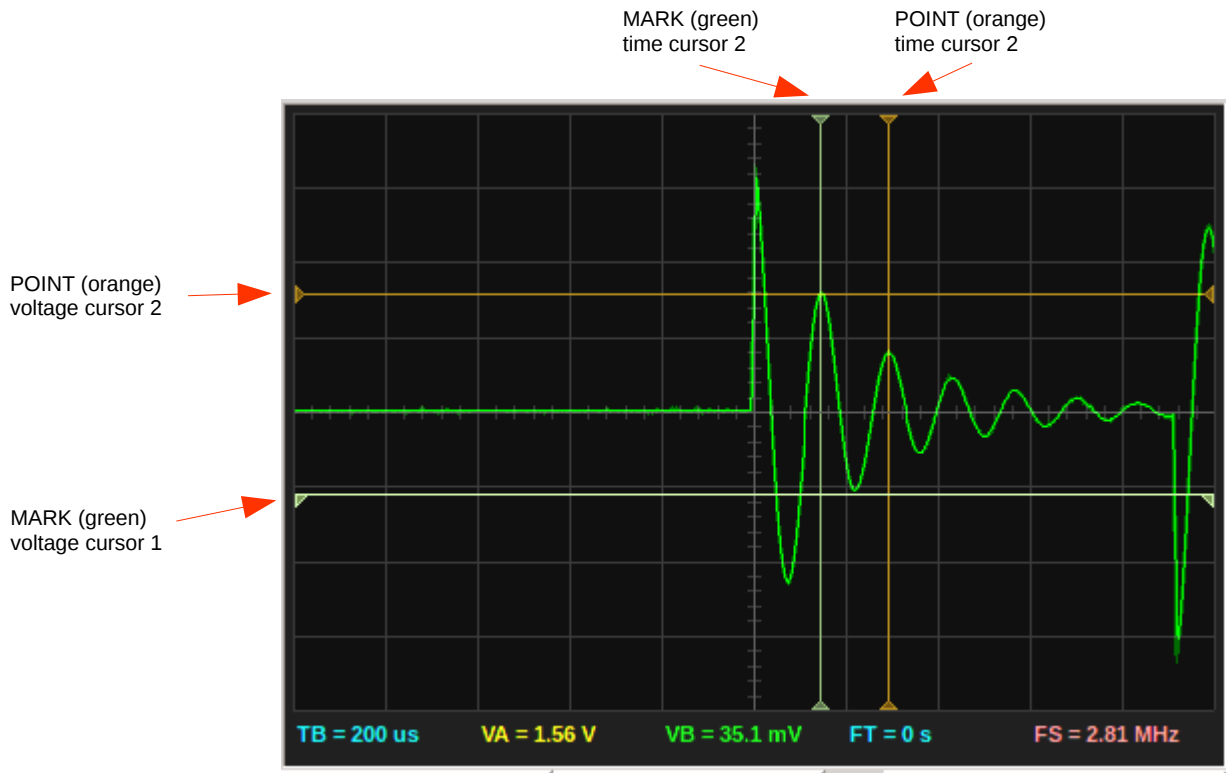
### Cursor measurements

Tip: it may be a good idea to turn off GRID when using the cursors.

The cursors are named

**MARK (1st cursor), green**

**POINT (2nd cursor), orange**



Time at orange cursor	292 us	1.58 V	Voltage at orange cursor (POINT)
Time at green cursor	144 us	-1.1 V	Voltage at green cursor (MARK)
Time between cursors	148 us	2.68 V	Difference voltage between cursors
Frequency given by time difference	6.756 76 kHz	18.1 mV/us	dV/dt between cursors can be used to measure slew rate (not in this example)

The time origin is in the middle of the display.

### Tracking cursors

Cursors can not only be moved manually, but also automatically by using the tracking mode. This changes the cursor value automatically as the signal changes.

#### Voltage cursors:

Right click into the voltage MARK or POINT field and select from menu:

REF = signal ground (no tracking)  
 MIN, MAX, MEAN, RMS  
 MEDIAN = midpoint between MAX and MIN  
 MARK, POINT = non tracking, interactively moved in the window  
 CENTRE = set to mid-point between current MARK and POINT values  
 TRIGGER = current trigger level

**Time cursors**

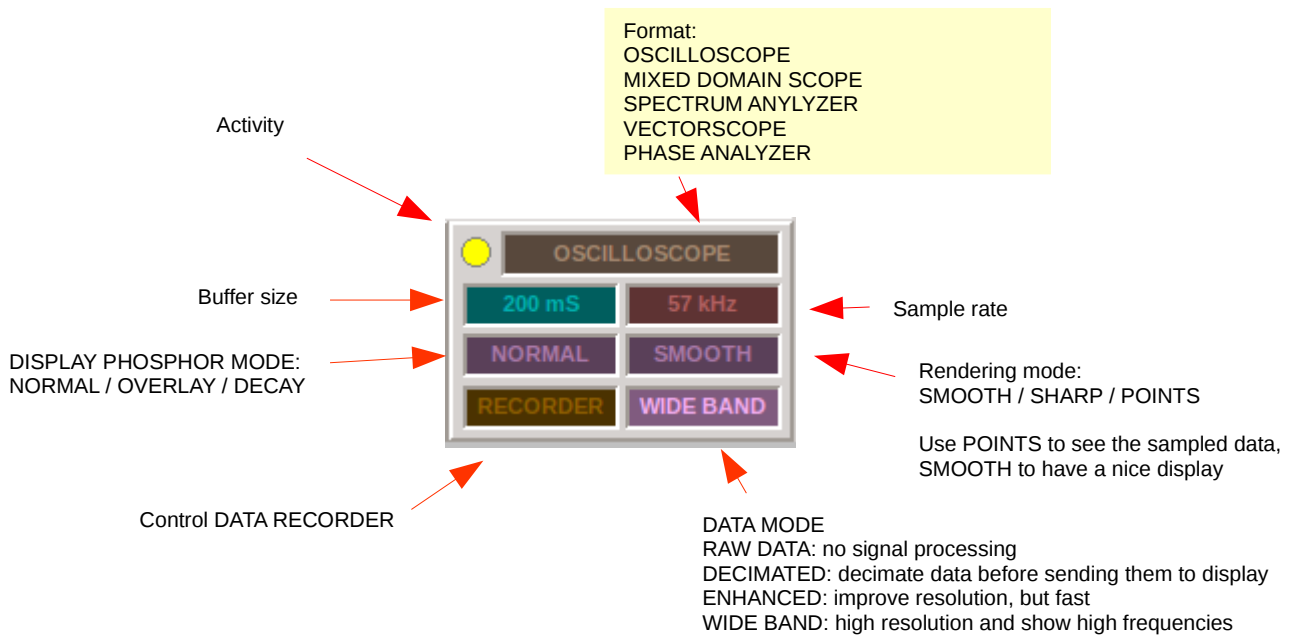
Right click into the time MARK or POINT field and select from menu:

FOCUS = in the middle of the display  
 TRIGGER = at the trigger point  
 MARK, POINT = non tracking, interactively moved in the window  
 CENTRE = set to mid-point between current MARK and POINT values  
 FIRST, LAST = set to first or last sample in the capture buffer

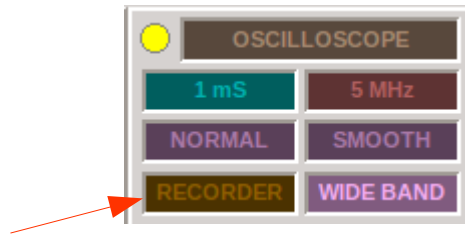
In the display, cursors are always visible so they can be dragged, even if the corresponding value is beyond the diagram limits.

**Capture control**

(Bottom right)



## DSO Data recorder



Control DATA RECORDER

### To temporarily record and replay:

Listen – Pause – Review

Review does not automatically show the recorded data!  
You have to use TRACE or REPEAT to see them.

### To record data to a file:

<Rklick> New - <file name> → the indicator shows Ready

Use REPEAT or TRACE (with or without AUTO) to start displaying and recording the data.

<Rklick> Close

### To replay recorded data:

<Rklick> Open <filename> → the indicator shows Play

<Rklick> - Play → the indicator shows PLAYING

TRACE shows the replayed waveform.

Recorded waveforms may be displayed with other time base settings than the ones they were recorded with.

### Data format:

Each data frame is listed in CSV format, together with metadata.

### Example:

```
trigger,stamp,channel,index,type,delay,factor,rate,count,data
5017,09:55:33,0,5611,0,0.000021,12,44000,439,2.5797,2.5797,2.5797,2.0943,0.39724,-
0.04371,-0.045703,-0.042779,....
```

5017	trigger event number
09:55:33	time stamp
0	channel CHA
5611	index identifying all data belonging to the same frame
0	data type (analog / logic /decimated / filtered ...)
0.000021	delay = post trigger delay
12	factor (decimation / oversample factor if any)
44000	rate = sample rate
439	count = number of samples in this record

data:

```
2.5797,2.5797,2.5797,2.0943,0.39724,-0.04371,-0.045703,-0.042779,.....
```



## Appendix

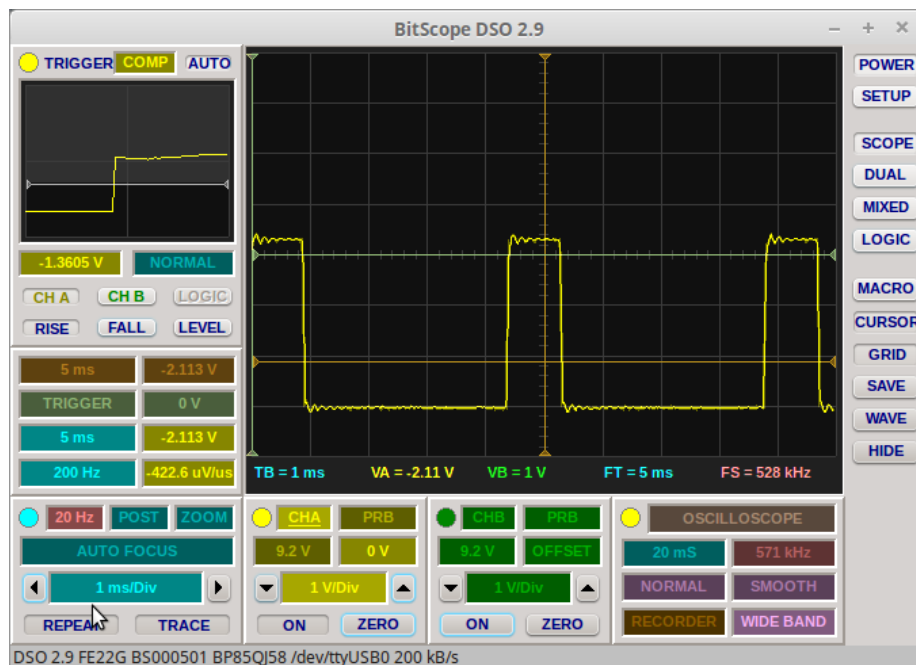
### The ZERO volt riddle

Example of a 3.3V digital signal.

The first question arising is: where is the 0V line?

I tried to use the cursors to solve this.

Under certain circumstances I have the right result, but under other circumstances I have a wrong indication from the cursors:



You see that the green cursor indicates 0V.

This would mean that my signal would have a negative offset (see curve and:  $V_A = -2.11V$ ), which obviously is wrong!

I found out that Right click on ZERO button, Reset ZERO brought the zero line to the middle of the display and everything was correct again.

According to Martin from [bitscope.com/support](https://bitscope.com/support) the right procedure is the following:

To get an accurate reading you need to Zero the curve.

Assuming you have a 1:1 probe connected, set the scale to 2V/Div.

Short the probe (at the tip or use Ref on the Probe).

Set the Channel Offset to REF (Right Click the Offset Panel).

Make sure the trace is on the zero line and click ZERO.

Turn cursors on and R-click the brown Cursor Panel to MAX - so it tracks the DC voltage

The Next step is important!

Left-Click the Offset panel and drag it down 2V. The trace and cursors should all move down 1 Div. Now apply the voltage to CHA and the cursor will record the voltage. What you have done is bias the BitScope range UP to favour positive voltages.

The key point here is that for DC measurements, you shift the offset of the channel to be unipolar to extend the range.

The other way to measure DC voltages is to use the 10:1 Scope Probe which effectively extends the range of BitScope.

Set the scaling to 10:1, 2V/Div. Do this before you adjust offset and ZERO.

To set the offset you must short the probe tip to GND (don't use the Ref setting), adjust the trace to the center, and then click ZERO.

No need to adjust the offset in this case (unless you are measuring 50V or similar - in which case do as above).

Now apply the voltage and read from the cursor.

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Please report any errors or suggestions to

[jean-claude.feltes@education](mailto:jean-claude.feltes@education)