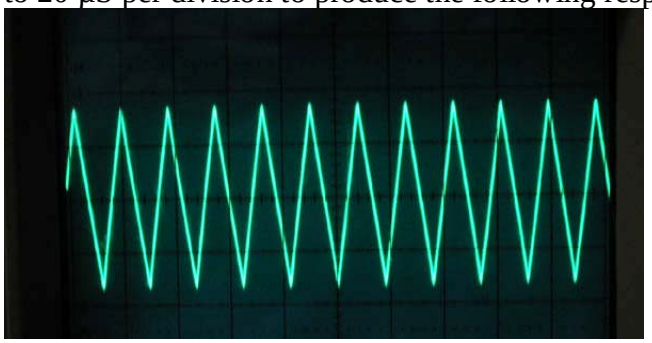
The A/B Delayed Time Base

Wes Hayward, w7zoi, 20Jan08

I recently acquired an older Tektronix 2235 100 MHz oscilloscope with the thought of sending it to a friend. He was asking about some of the features and the time base came up as a refinement that was not in his background. This note is intended to illustrate the A and B time bases built into the 'scope with some photos.

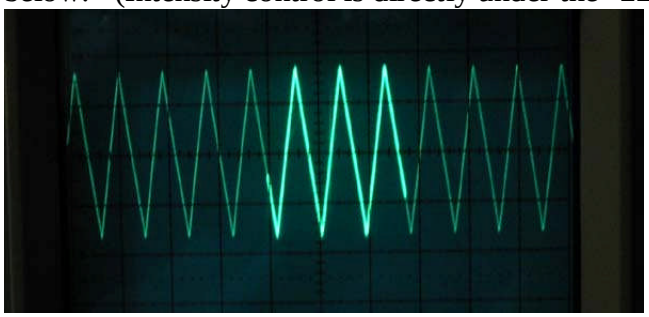
These features are illustrated by applying a sawtooth waveform to Channel 1 of the instrument. It was at a frequency of about 100 kHz, as I recall. The time base was set to 20 µS per division to produce the following response on the screen.



Sawtooth waveform.

The *horizontal mode* switch was in the A position for this sweep. This particular oscilloscope has dual intensity knobs, one for the A and another for the B sweeps. The inner small knob controlling B was fully CCW (counter clock wise) to effectively turn off a B sweep.

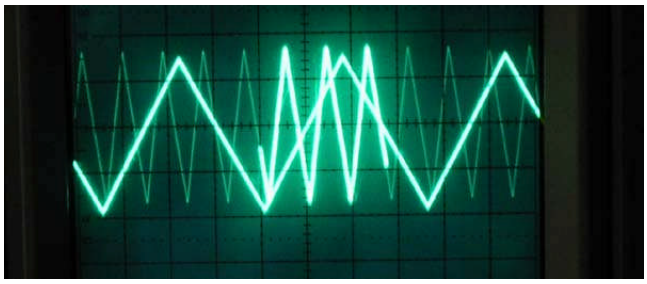
We now get ready for the next sweep. The *horizontal mode* is set to Alt. This means that the sweep will use alternate sweeps with the A and then the B modes. The *B Trigger Level* knob is turned fully CW (clockwise) to point at the blue region on the front panel. Now pull the time base knob (*A and B Sec/div*) outward and rotate it CW by a couple of clicks to 5 per div. Adjust the *Intensity-A* knob to produce the display shown below. (Intensity control is directly under the "2235" label at the top of the front panel.)



Intensified Display

While we have this display, turn the *B Delay Time Position* knob and note the intensified region moving around the display.

We now turn up the intensity of the B display. This is the smaller intensity knob. The result is shown below.

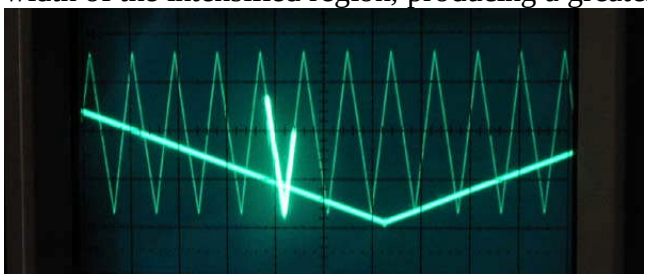


Intensified A sweep plus the B sweep. The B sweep is exactly the same as the intensified portion of the A sweep. Both intensities can be controlled with the knobs.

Shown below is the front panel when the above display was obtained. The various critical items are noted with red lettering.

Front panel with critical items marked.

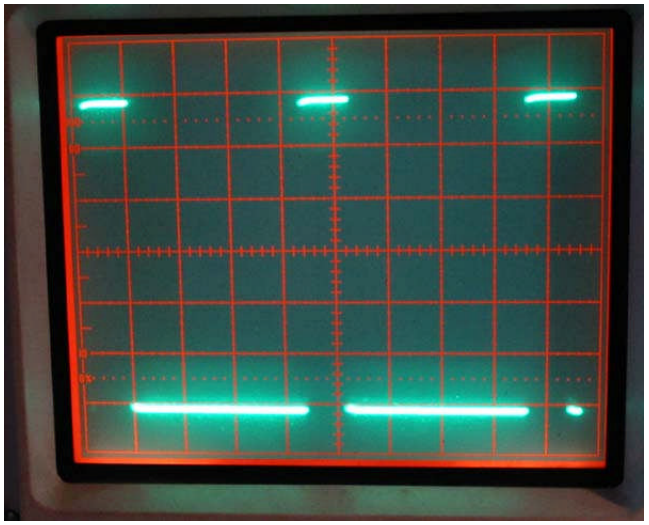
Finally, we rotate the timebase knob a couple more positions CW. This will reduce the width of the intensified region, producing a greater zoom with the B sweep.



Greater zoom.

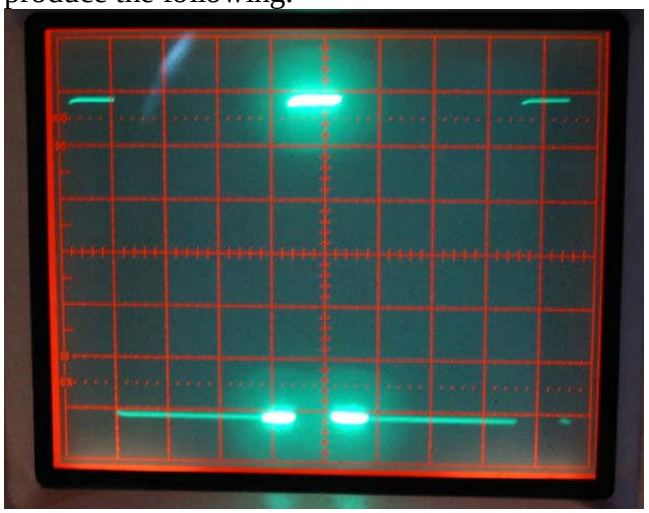
An interesting experiment is to now rotate the *B Trigger Level* knob away from the blue fully CW position. This produces a situation where the B sweep is triggered rather than being started at the end of an intensified region.

Next we shift to an older oscilloscope, a 465M. The 465 series 100 MHz instrument is a very popular tool, even today, and is now a commonly encountered element within the lab of the amateur experimenter. The first thing we examine is a pulse train generated with a Wavetek Model 145 20 MHz Pulse/Function Generator.



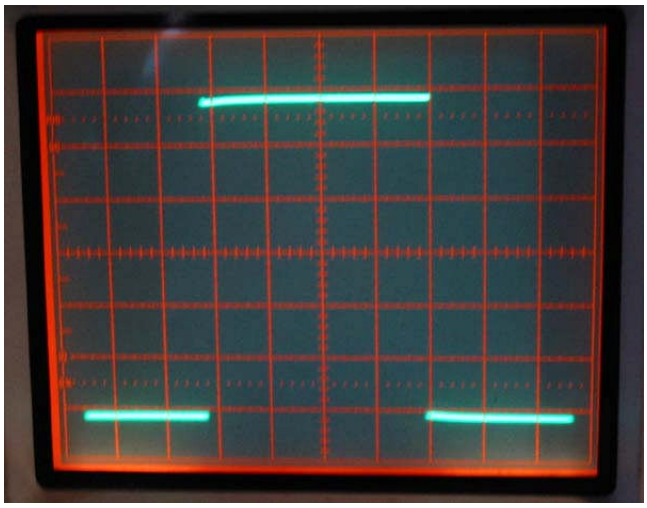
A train of pulses displayed with the A Timebase.

We now pull the *timebase* knob out and turn it clockwise for two clicks, shift the *horizontal mode* to A Inten to intensify part of the screen, and tune the *delay* knob to produce the following.



The middle of the pulses shown on the screen is intensified.

Finally, we change the *horizontal mode* to the B DLY'D position to see the following.



Now only the inside pulse is shown, but with both the rising and falling edges displayed.

The timebase settings could now be changed to examine the signal in greater detail. It is interesting to begin by showing a large number of cycles on the screen with the A sweep. The timebase might be adjusted to show little more than a solid band of data. Then the A trace is intensified and the *B delay time position* is tuned to intensify a very small region near the end of the large number of cycles. Shifting to a *horizontal mode* of B DLY'D will now show these pulses after a long delay. They may well appear fuzzy. The extent of this "fuzz" is a measure of the jitter. It is never clear if this is a measure of jitter in the source or the timing circuitry in the oscilloscope.