TPU v4.0 TEST SERIES
02/12/2006

This TPU is wound of three collector coils. Around each collector is a control coil which goes all the way around it. Then over this is another coil, then another.

So we have 3 collectors, each collector has 3 coils wound over it at 90 degrees. Each of these 3 are over each other, not in segments. This is to allow the frequencys to mix with each other.

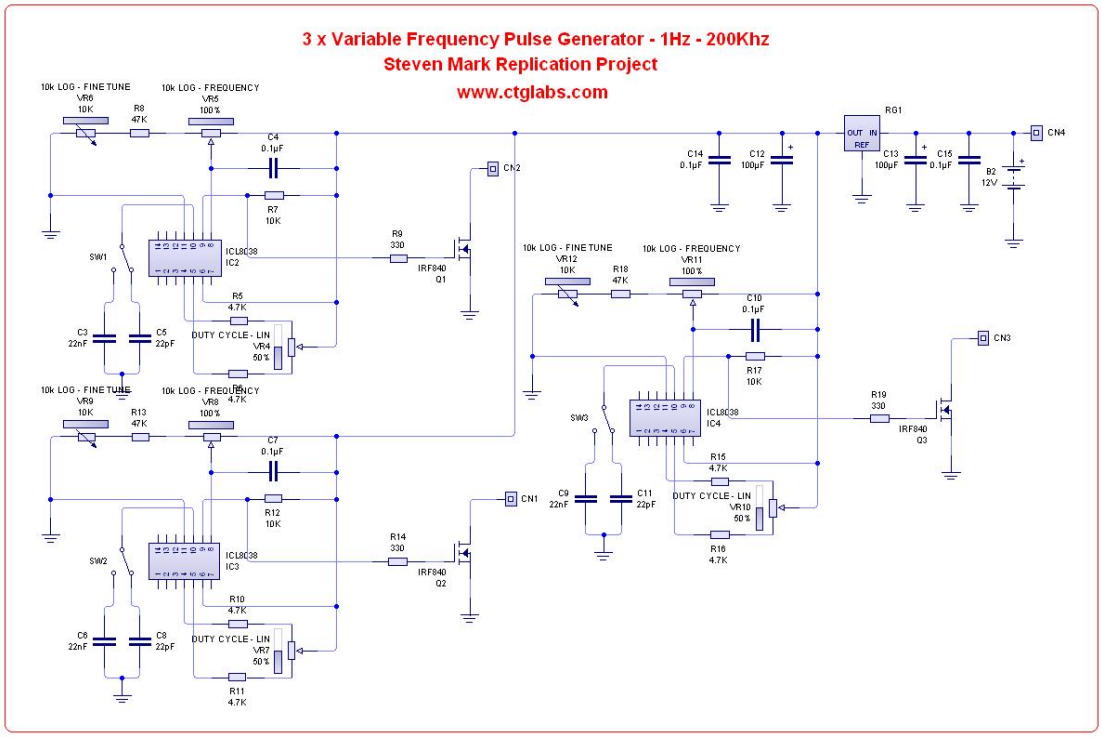
The output signals have been taken from the outer control coil which goes around all of it. They also appear on the 90 degree collectors but much much reduced because although the effect is additive, its still normal induction.

I have constructed a 3 output variable pulse frequency generator and placed a different frequency on each control coil. Identical for each layer.

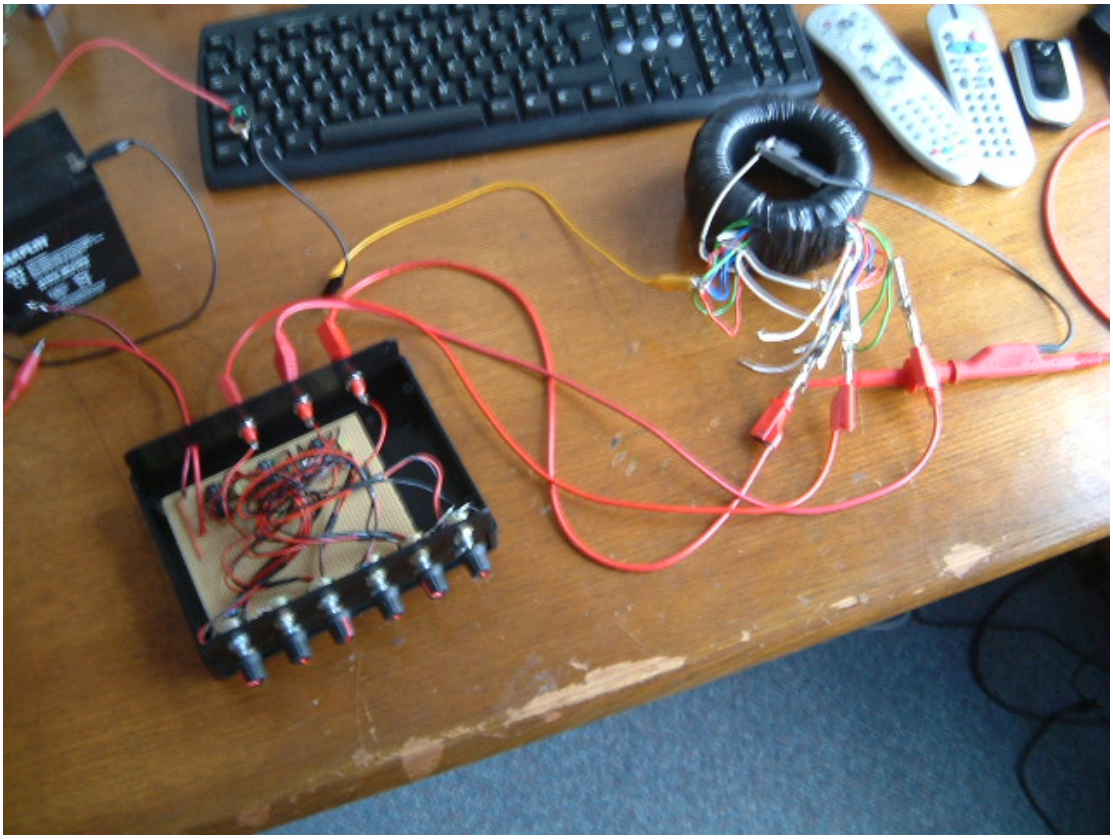
The coil wound closest to the 90 degree collector is 31Khz, the middle is 166Khz and the outer 44khz. These were found by just adjusting each control know randomly until the additive spikes where seen.

When all three frequencys are present, there are spikes which add. If any one of the frequencys is removed a steady level signal is seen, no adding.

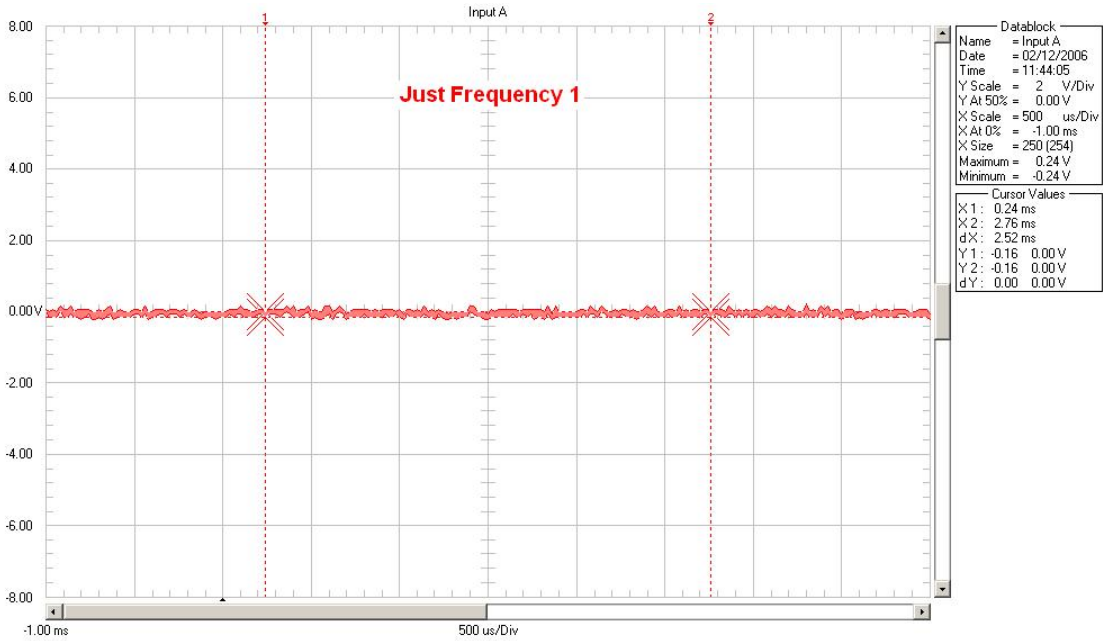
The control circuit

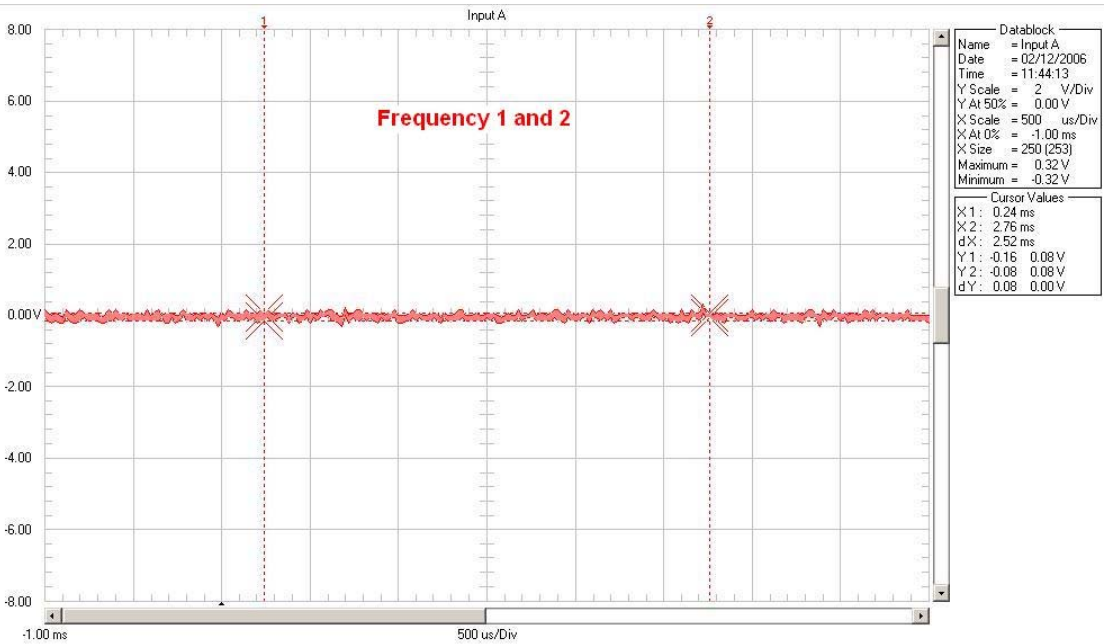


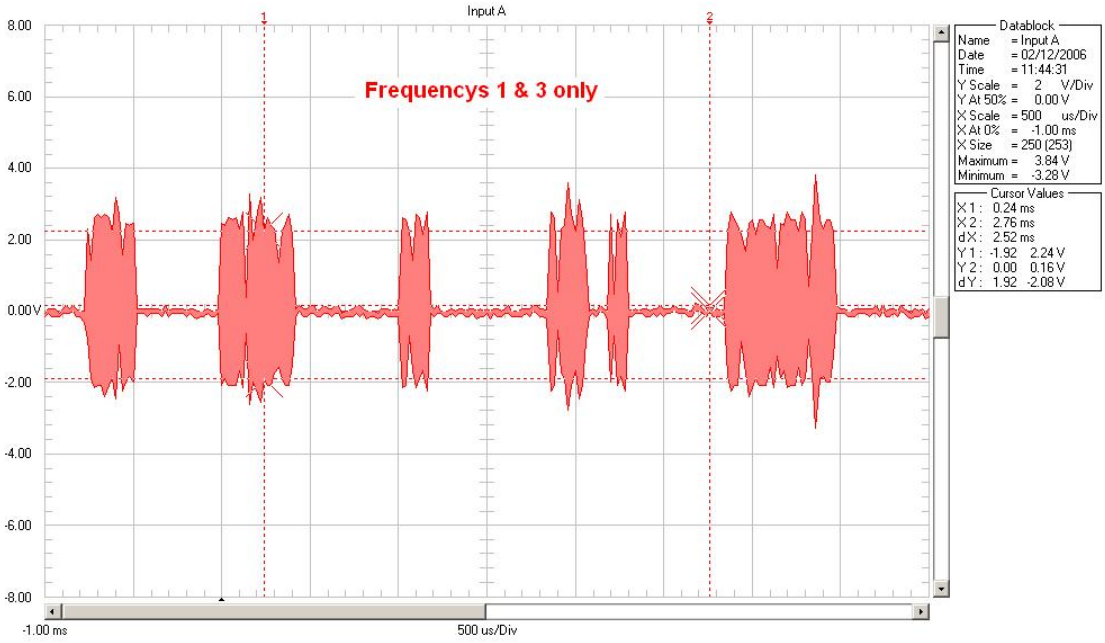
The Test Setup

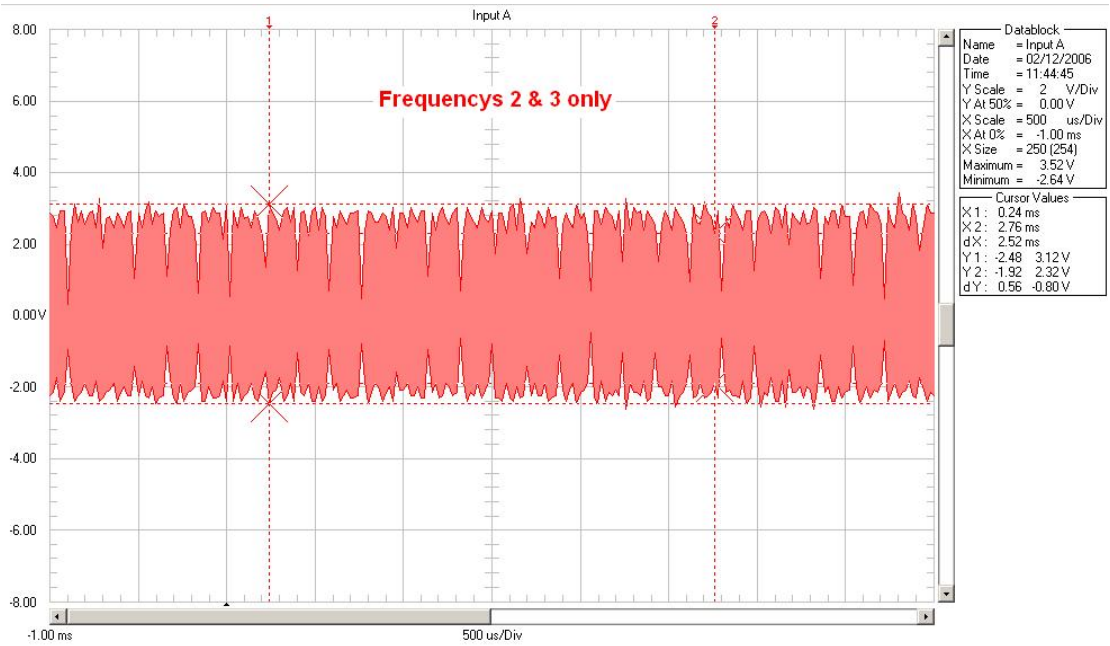


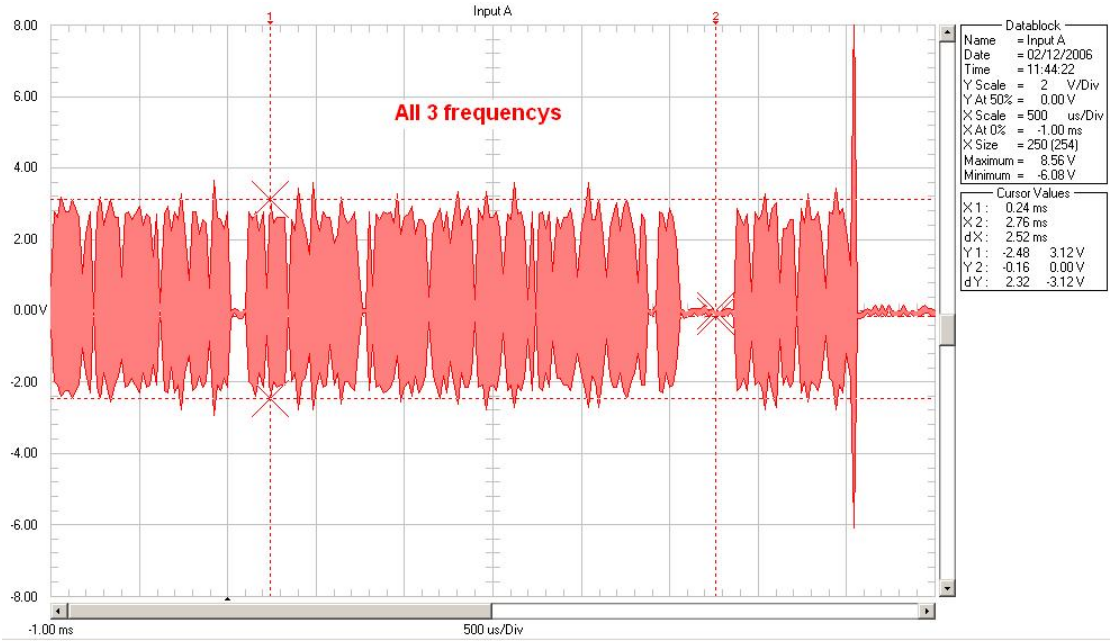
Output signals, with just one, then 2, then all 3 frequencies input



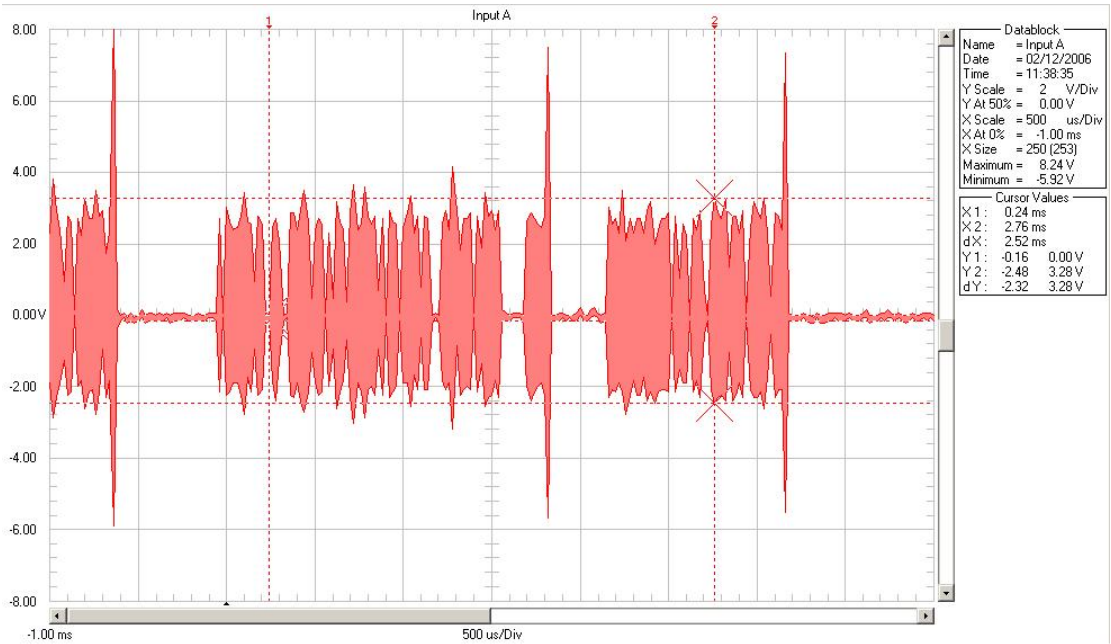



Input A
Frequencys 1 & 3 only
8.00
6.00
4.00
2.00
0.00 V
-2.00
-4.00
-6.00
-8.00
-1.00 ms
500 us/Div
Datablock
Name = Input A
Date = 02/12/2006
Time = 11:44:31
Y Scale = 2 V/Div
Y At 50% = 0.00 V
X Scale = 500 us/Div
X At 0% = -1.00 ms
X Size = 250 [253]
Maximum = 3.84 V
Minimum = -3.28 V
Cursor Values
X 1 : 0.24 ms
X 2 : 2.76 ms
dX : 2.52 ms
Y 1 : -1.92 2.24 V
Y 2 : 0.00 0.16 V
dY : 1.92 -2.08 V

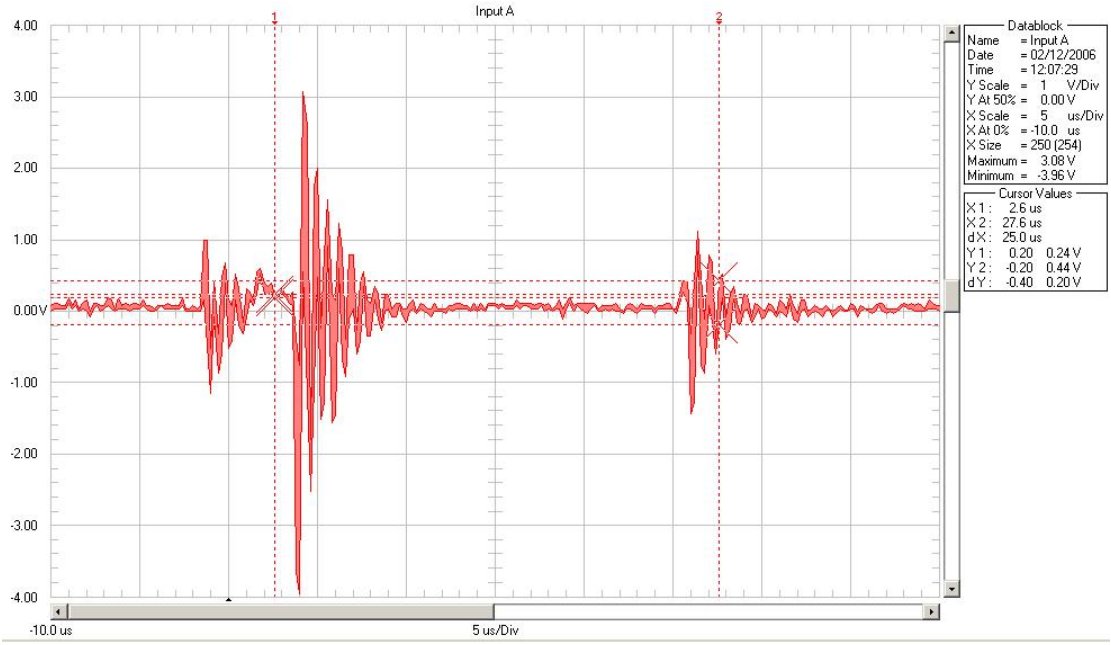

Input A
Frequencys 2 & 3 only
8.00
6.00
4.00
2.00
0.00 V
-2.00
-4.00
-6.00
-8.00
-1.00 ms
500 us/Div
Datablock
Name = Input A
Date = 02/12/2006
Time = 11:44:45
Y Scale = 2 V/Div
Y At 50% = 0.00 V
X Scale = 500 us/Div
X At 0% = -1.00 ms
X Size = 250 [254]
Maximum = 3.52 V
Minimum = -2.64 V
Cursor Values
X 1 : 0.24 ms
X 2 : 2.76 ms
dX : 2.52 ms
Y 1 : -2.48 3.12 V
Y 2 : -1.92 2.32 V
dY : 0.56 -0.80 V



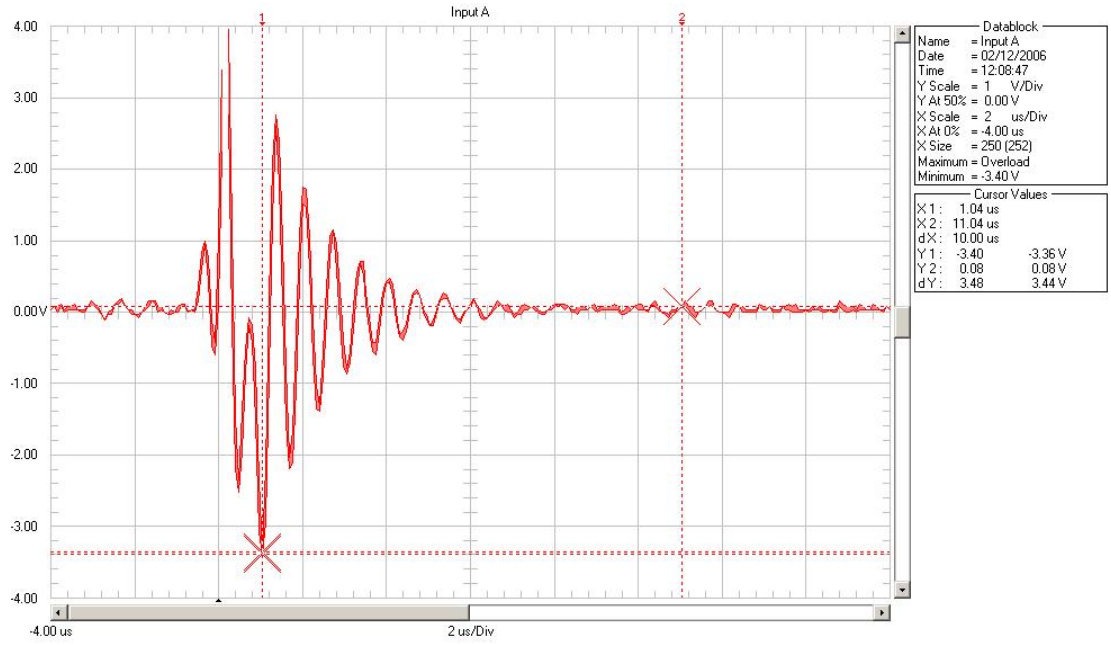
When all 3 frequencies are applied we see these spikes at certain times. These do not appear unless all 3 are used at once.



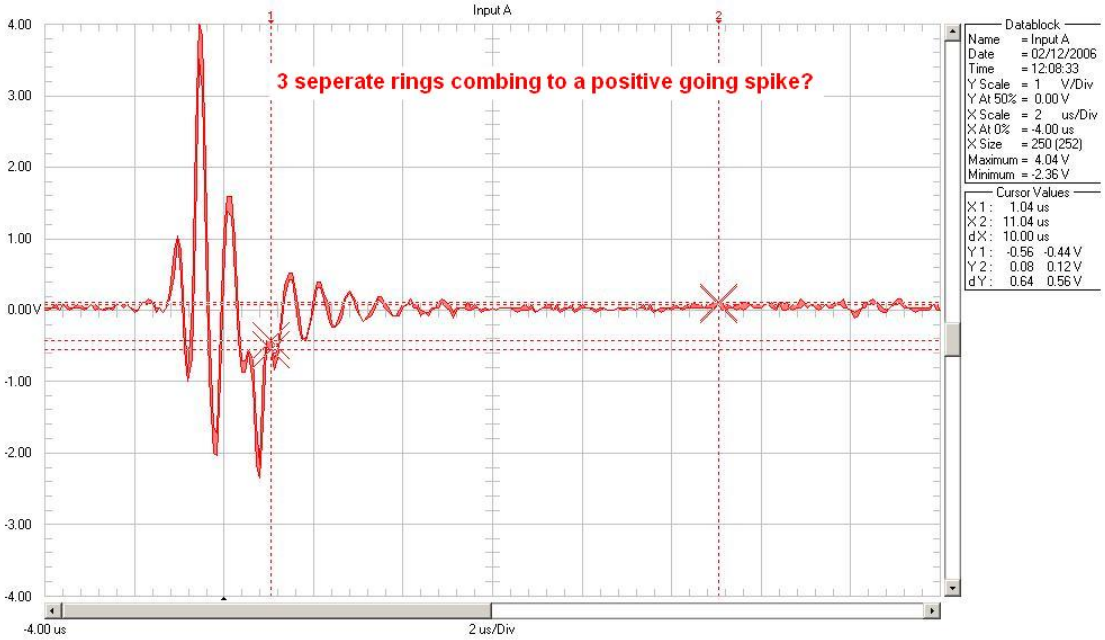
If we "zoom" in, we can see better what is happening. Each pulse creates a resonant signal/ringing in the collector. When the signals from each 3 frequencies mix at the right point, a ring which is much larger results.



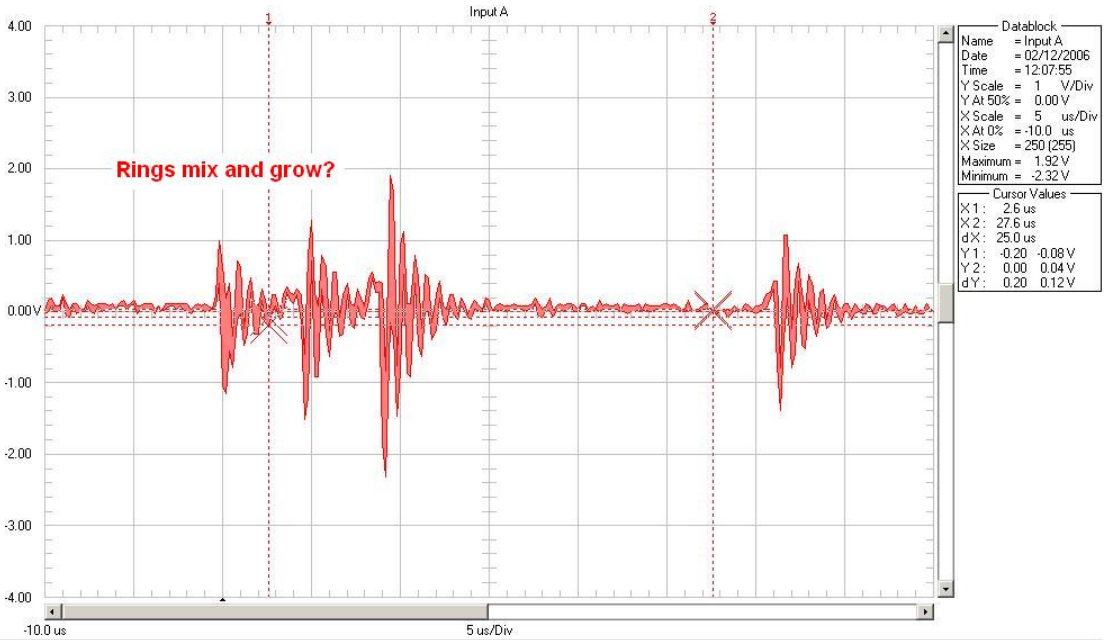
The phases of each ring are always different and at times the combined ring starts to take on a different shape.

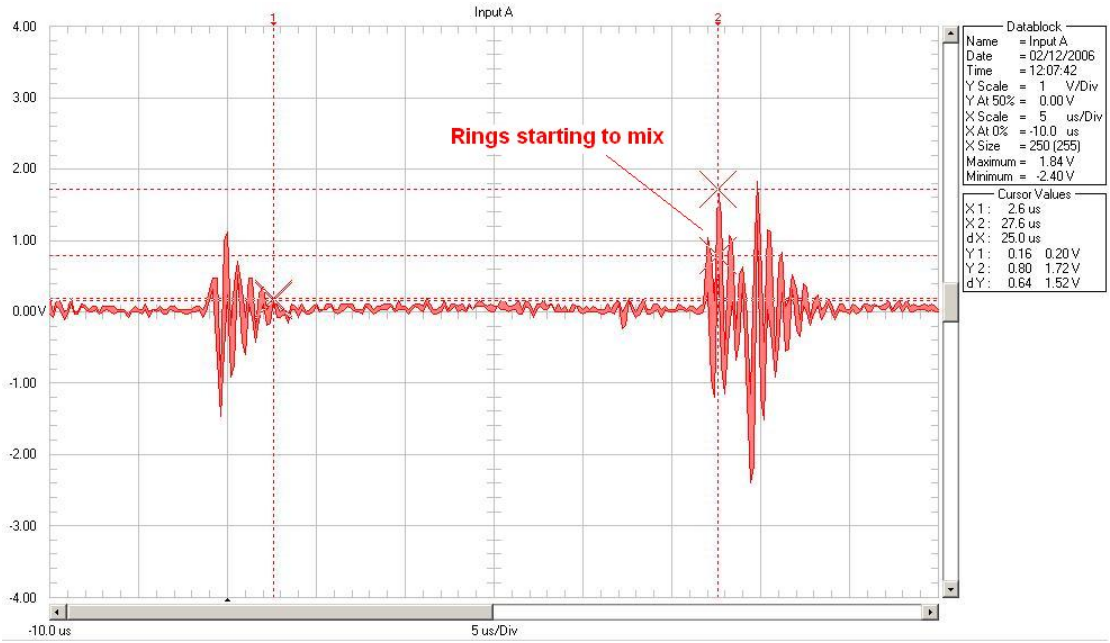


Indeed, the combined ring starts to turn in to a combined spike or kick which is mostly in the positive only direction.



Some general signals showing how the rings look at certain times.




Input A
Rings starting to mix
Datablock
Name = Input A
Date = 02/12/2006
Time = 12:07:42
Y Scale = 1 V/Div
Y At 50% = 0.00 V
X Scale = 5 us/Div
X At 0% = -10.0 us
X Size = 250 (255)
Maximum = 1.84 V
Minimum = -2.40 V
Cursor Values
X 1 : 2.6 us
X 2 : 27.6 us
dX : 25.0 us
Y 1 : 0.16 0.20 V
Y 2 : 0.80 1.72 V
dY : 0.64 1.52 V
4.00
3.00
2.00
1.00
0.00 V
-1.00
-2.00
-3.00
-4.00
-10.0 us
5 us/Div