Notes: input buffer modification

I've recently updated my oscilloscope. With the new scope I've discovered an issue with the inputs of the 8 Channel Quantizer that didn't show up with my old CRT scope. My older scope is 20Mhz and I think this just didn't show on it.

The issue is that the input multiplexer that sends the 8 channels to the PIC ADC is adding large very short (about half a microsecond) negative going spikes to the input. They're present on the inputed signal once it's plugged into a Quantizer input. This doesn't affect the accuracy of the Quantizer, the input sample period is much longer than the spike, but the spikes will be present if you plug the same output into another module.

This isn't a "must-do" fix, the Quantizer works as it is, and I've noticed no difference in it's operation after installing the fix. But doing the fix will keep the spikes from being present on the signal plugged into the Quantizer, which could effect other modules that the signal goes to.
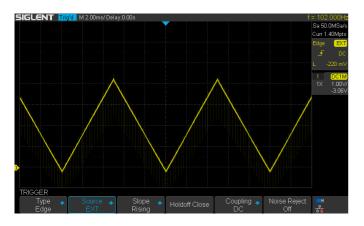
The solutions involve replacing the DG408 multiplexer chip with one specifically designed with low charge injection, and/or installing input buffers on channels 1-7. Input buffer PCBs using SOIC TL074s and 805 passives are available from me and if you contact me I'll be happy to send you one
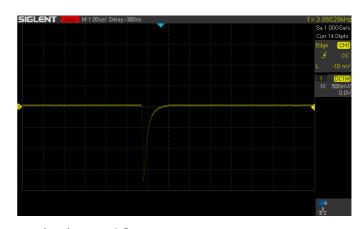
Clee Quantizer input buffer modification

The Quantizers input multiplexer chip is adding large very short (about 0.5usec) negative going spikes to the input. They will be present on the inputed signal once the patch cable is plugged in. They show up because the output protection resistor of the module you're plugging in causes an output impedance between 100R-1K0 and charge injection in the multiplexing chip causes a spike at it's FET drain which is connected to a high impedance node.

This doesn't affect the accuracy of the Quantizer, the input sample period of the ADC is much longer that the spike so the signal will settle, but the spikes will be present if you plug the same output into another module
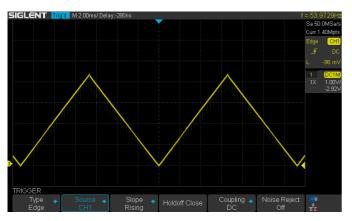
The solutions involve replacing the DG408 multiplexer chip with a DG408CJ+ chip specifically designed with a low charge injection, and/or installing input buffers on channels 1-7. Changing the chip and installing the buffer board will be the most effective solution. Channel 8 is already buffered by the attenuverting input control

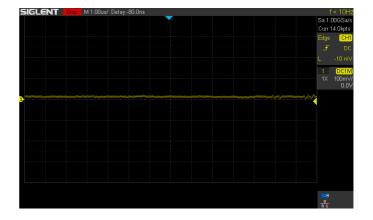origingal DG408/ original unmodified circuit

transient is aprox 1.8v

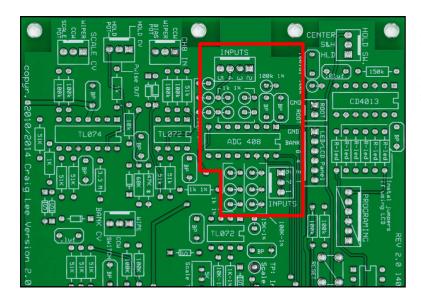replaced DG408 /original unmodified circuit

transient is aprox 0.3v

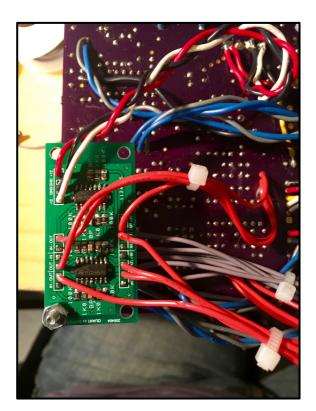replaced DG408/ input buffers installed

Replace this DG408 with DG408CJ+, this is the version with the lowest charge injection

If building a new Quantizer, don't install these 100K resistors and replace the 1K0 with jumper wire
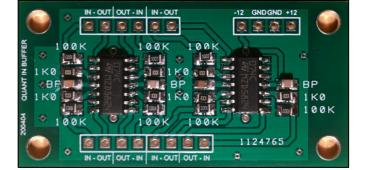

The buffer board is a small PCB with 7 unity gain buffers.
Wire the connections from the panel jack to IN on the buffer board, and the buffer board OUT going to the inputs of the Quantizer PCB.

Connect inputs 1-7. Input 8 is already buffered by the processing input circuit

The red wires are the inputs to the Quantizer main board. The gray wires are from the front panel
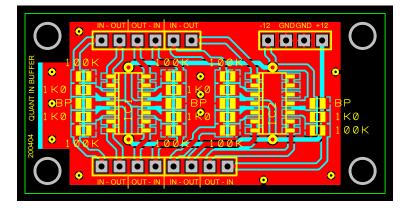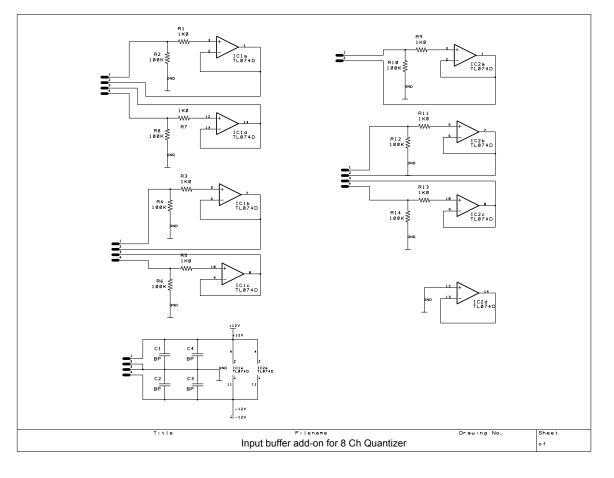
Input buffer PCB

This small PCB can be mounted to one corner of the main Quantizer PCB.

The panel input jacks should be connected to the pads marked IN, and the OUT pads should be connected to the Quantizer main PCB inputs

If you have a board without PIN 1 designated, PIN 1 is UP in this picture.

Input buffer add-on for 8 Ch Quantizer

PARTS:

2 TL074 SO14 Op Amps
4 100n 0805 ceramic capacitors
7 100K 0805 resistors
7 1K0 0805 resistors