1. **Invention Title.**

Improved Method of CW Carrier Testing for Channel Impairments

2. **Invention Summary**

Previous CableLabs work included a device called a CWTester™. This invention is an improvement on that system because it does not require a phase-locked-loop to demodulate the test carrier. The CW Carrier is dropped into a narrow notch filter. Interference will cause the carrier's sidebands to fall outside the notch filter's range. This creates a trigger signal that causes a trace capture, followed by a recording.

3. **Invention Description**.

a. Describe the invention in detail.

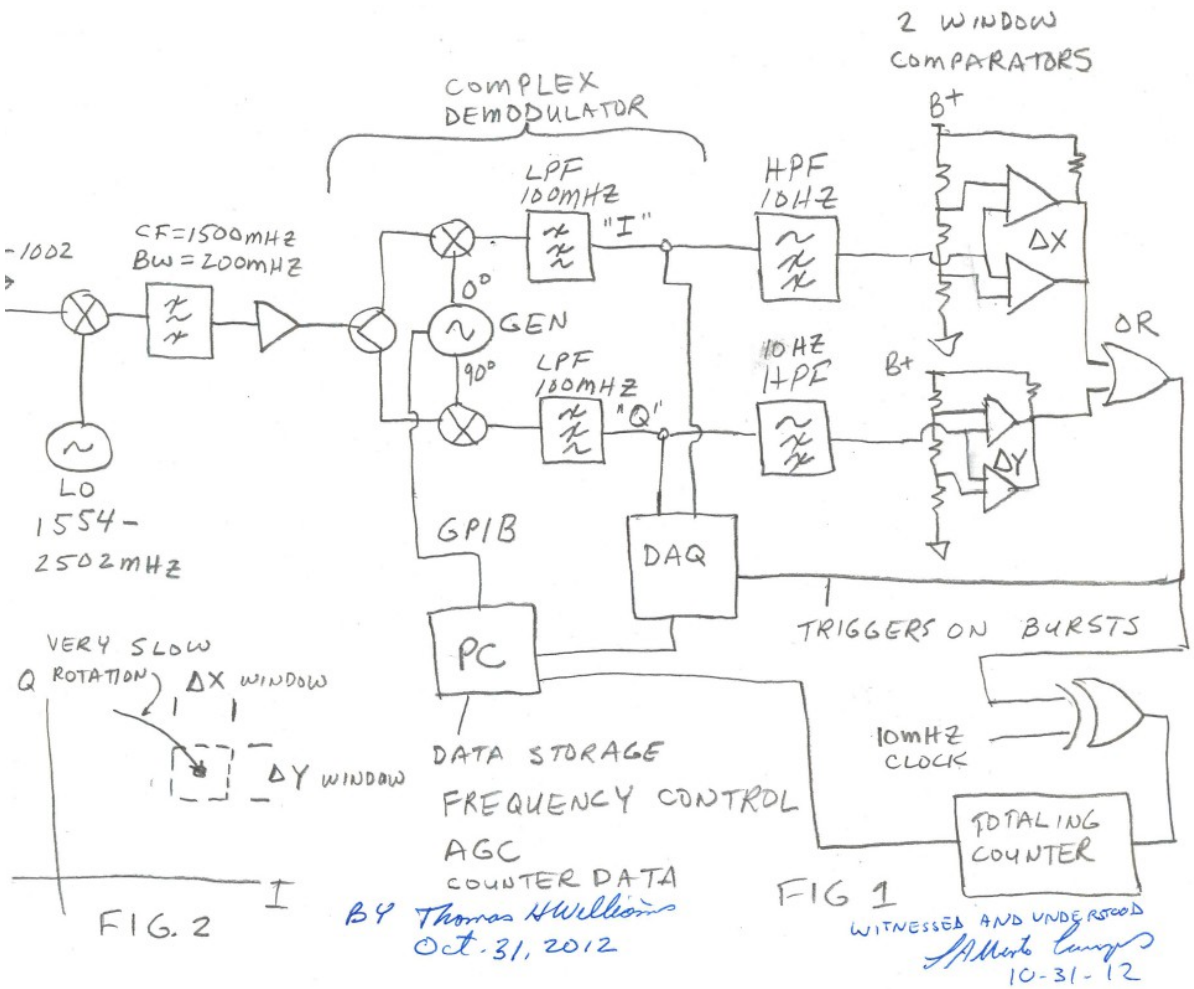
See Fig. 1. The full cable spectrum is applied to the input on the left. A vacant band of spectrum, say 200 MHz, has a test CW carrier in the middle. A mixer mixes a high side LO and CW carrier to a 1500MHz IF frequency where the signal plus impairments are applied to a bandpass filter and an amplifier. A complex demodulator, using a generator (GEN) with 0 and 90 degree outputs, generates I and Q baseband outputs. The frequency of the GEN is very close to the incoming carrier's frequency, but is not phase locked to the incoming carrier. A high-speed A-D converter (DAQ) measures the frequency offset as the frequency of a rotating phasor. The DAQ data are downloaded to the PC where a command is given to GEN over GPIB to fine-tune adjust its frequency to be within a few Hz of the incoming CW carrier. This adjustment generates a very-slowly rotating phasor which is filtered by the 10 Hz highpass filters. See Fig 2.

When a burst of noise appears in the 200 MHz test band, the burst signal will pass through the complex demodulator and trigger the two window comparators, which are tracking the slowly-rotating CW's phasor. This trigger causes the DAQ to capture a trace with burst details for storage by the PC.

An optional totaling counter with a gated 10 MHz clock counts the number of clock ticks that occur while the demodulated rotating CW is outside its window illustrated in Fig.1. Thus, a raw error rate can be estimated.

The PC can also function as an AGC circuit by scaling the DAQ data to record a constant CW phasor length.

This system records both additive and multiplicative impairments in the 200 MHz channel.



b. Why was the invention developed? What problem(s) does the invention solve? How is it better?
A great simplification over the 1995 CWTester which needed a phase-locked-loop (PLL).

c. Briefly outline the potential commercial value and customers of the invention.
Testing upstream and downstream. Possible licensing to test equipment manufacturers.

4. **HOW is your invention different from existing products, processes, systems?**
Compared to previous CWTester, no PLL.