**Test: Replacing Obsolete Test Systems by Defining the Waveform & Function**
**Industry: – Nuclear Power Industry**
**Unique Requirements: Variable Sweep, Negative-Going Pulse**

We received a call from a good customer who happened to be upgrading their test equipment as part of a preventative maintenance program. They were interested in duplicating a test system used for calibrating safety equipment in their plant. The original system utilized two of the former Tektronix TM-series instruments; the FG501A, 2MHz Function Generator and PG501, 50 MHz Pulse Generator. The customer initially called requesting replacement products which meet or exceed the specifications of these instruments. Unfortunately, after reviewing the data sheets for each of these devices, we were able to confirm that no 100% spec-for-spec match was available.

We then asked the customer about the application. "What are you trying to accomplish? Do you have a test procedure that we could review?" The customer described the test procedure over the phone. They were using the FG501A to generate a swept signal from 1Hz to 500KHz to drive the trigger input of the pulse generator. The FG501A unit would be swept manually from the front panel. The pulse generator was used to create a negative-going pulse of 100nS width. Its repetition rate would follow the input sweep frequency with a varying duty cycle but fixed pulse width.

After receiving the test description, it became apparent that a TEGAM solution was well within reach. We recommended using a Model 1404A, DDS Function/Sweep Generator to replace the FG501A. It has a sine wave output with a square wave TTL sync output that follows the output. The frequency range, 10mHz-20MHz, of the 1404A would easily meet the required span and the frequency could be manually adjusted from the front panel. To replace the pulse generator, we recommended using the Model 2414B. The requirement for a negative-going pulse was somewhat unique and we wanted to design flexibility in our recommendation so the 2414B and its arbitrary capability were prime candidates. Not only could the instruments be used for this test but should the need arise in the future, the customer would have the flexibility of the arb to use in many other applications.

The final stage of the process required verification of operation. We created the inverting pulse by defining an arbitrary waveform within the 2414B. The total length of the waveform was limited to 2uS (40 data samples @ 20MS/s) so that we could maintain a 500kHz maximum repetition rate for the pulse. Because of the simplicity of the pulse, we were able to create it directly from the front panel without the need for any software. The 2414B was then put into the external trigger mode and driven by the TTL output of the 1404A sweep generator. The required test conditions were precisely recreated and the customer recommended these TEGAM products to management to replace the obsolete instruments.

Initially, we were asked to replace existing instruments based on specifications alone. Trying to replace complex test equipment based on specifications alone is almost always a lost cause. Seldom do instrument specifications match 100%. However, by looking into the application itself, we learned that the actual needs of the customer were relatively simple and could be performed by using similar equipment. In this case, the customer was able to meet their initial needs and engineer additional capability to their test system should the requirements change in the future. This became a win – win situation for both TEGAM and our valued customer.