

Overview

There are many specialized measurements needed when testing or calibrating an Electronic Support Measures (ESM) system. One critical measurement that the ESM receiver needs to make is to be able to detect a number of frequencies across a wide frequency band in a given period of time, often synchronized to a GPS clock.

Test Signal

Typically a microwave signal generator is used to provide the test signals for this type of measurement. These test signals consist of many continuous wave (CW) signals at various frequencies and/or amplitudes. Additionally, the test signal frequencies and amplitudes are likely not to be in a linear ascending or descending values. Moreover, the test signals switch between different frequencies and/or amplitudes very quickly. In some cases, switching between frequencies and/or amplitudes in a matter of microseconds.

Giga-tronics 2500B Microwave Signal Generators

The Giga-tronics 2500B Series Microwave Signal Generators have a list sweep mode (list mode) that creates the needed test signal to adequately stimulate your ESM receiver for you to make the required measurements. The signal generator's list mode feature gives you the ability to create a list of arbitrary frequency, amplitude, and dwell time values and sweep the RF output based on this list of values you've created.

The signal generator provides a couple of different ways to create this list of values. One way to create the list is to use Standard Commands for Programmable Instruments (SCPI) commands. One disadvantage of using SCPI, is the time required to send, parse, and process the command before switching can begin. In addition, separate commands are required to change individual settings, which will require additional time to process the separate commands. For example, two commands are needed when switching frequency and amplitude. Another way to create a list is to use Automation Xpress from Giga-tronics, which is a much faster approach.

Automation Xpress

Automation Xpress (AX) is free software for the 2500B Microwave Signal Generators that runs on a PC and can be used to control and program the signal generator. Automation Xpress provides a Graphical User Interface (GUI) and an Application Programming Interface (API) in the form of a Dynamic Link Library (DLL). AX can be used to set and control the same 2500B functions that be controlled on the front panel and more.



Creating a List Using Automation Xpress

Using AX, you may create a list of frequencies and/or amplitudes two different ways. One way is by defining all required parameters in a program such as Excel and saving this data as a text file and loading it into AX. The second method of creating a list is to use the “List Editor” menu in AX. This approach automatically creates a table of values based on the initial conditions that are set, such as setting a beginning and ending frequency value and the step size. Once the lists are created, they can be saved and downloaded to the instrument each time a new test is required.

Example

- **Test Signal Setup**

Figure 1 below shows the “List Editor” and “List Controller” set up screens from Automation Xpress. It shows a start frequency of 2 GHz and stop frequency of 3 GHz, a 10 ms step or dwell time, and 21 points between the start and stop frequencies. Alternatively, the configuration could have been set up to increment a specific frequency step size. By using 21 points and a 10 ms dwell, we can easily calculate that the complete list should be completed in 210 ms. For this example the power level of the first two frequency points are changed from 0 dBm to -10 dBm to demonstrate the versatility of List Mode to change the power/frequency or dwell time of each point. Additionally, changing the power for these two points will help us see the precise timing of the signal generator using a peak power meter to make this simple measurement.

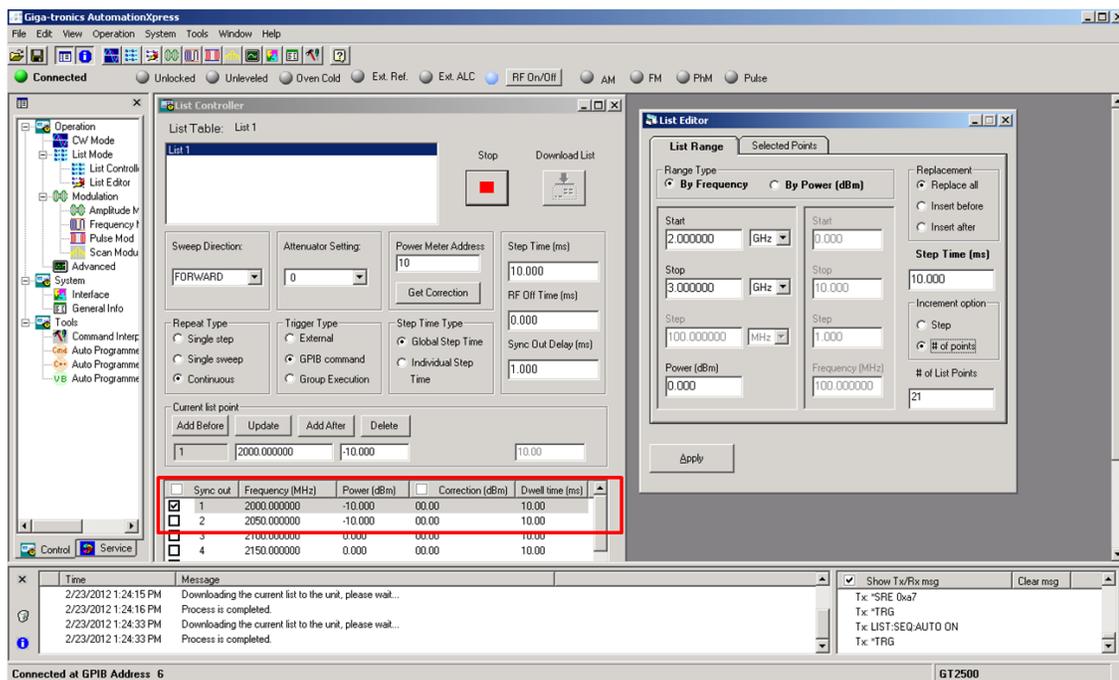


Figure 1: List Controller and the List Editor menus. Note that the first two points are set to -10 dBm.

Measurement Setup

The test signal in this example is measured using the Giga-tronics GT-8552B USB Peak Power Sensor, which is able to measure pulse parameters and display power versus time. See Figure 2.

The marker delta time displayed in the “Marker/Delta” Status window shows that all the 21 steps were completed in precisely 210 ms. Even if the signal generator is triggered from a precise GPS clock, the list of frequencies will be transmitted at the precise time necessary to stay coordinated with an ESM receiver, which would also be synchronized to a GPS clock.



Summary:

The Giga-tronics 2500B Series Microwave Signal Generators have a fast list mode that creates the needed test signal to adequately stimulate many ESM receivers.

Below are some specifications for the 2500B List Mode:

2500B List Mode Specifications ¹		
Number of Points	4000	
Frequency Settling	2 ms minimum	
Frequency Settling Option 29	< 550 μ s for $\Delta F \leq 500$ MHz	
Amplitude Settling	< 500 μ s	
Digital Sweep	Trigger Modes	External, GPIB GET, Software
	Sweep Modes	Continuous, Single Step, Single Sweep
Step Time	Standard	2 ms to 1 sec
	Option 29	150 μ s to 1 sec
Sync Out Delay	50 μ s to 10 ms	50 μ s to 10 ms
Sync Out Delay Resolution	10 ns	10 ns

¹ For complete specification, refer to 2500B Data Sheet

For more information:

More information about the products mentioned in this technical brief may be found from our website.

www.gigatronics.com

2500B Series Microwave Signal Generator Data Sheet

<http://www.gigatronics.com/uploads/document/2500B-Datasheet.pdf>

GT-8552A USB Power Sensor Data Sheet

<http://www.gigatronics.com/uploads/document/GT-8552A-US111005.pdf>



www.gigatronics.com

Phone / Email

Toll free: 800.726.4442 (USA)

+1 925.328.4650 (International)

Email: inquiries@gigatronics.com

