Transcript
Demonstration of 409B Table Mode and the –AC Option

Hello, and welcome to a Novatech Instruments presentation of the Model 409B DDS Signal Generator. In this video, we will demonstrate the functionality of the table mode, which gives you the ability to change frequencies according to a user programmable table stored in RAM. Frequency changes occur due to either a timing scheme set up in the table or external timing. Within external timing there is both a software trigger and external hardware triggers. Please note that when using external triggering your model 409B must be set up with the AC rear panel option.

On the front panel there's an indicator light and four, BNC outputs. It is important to note that, in table mode, only Channel 0 and 1 are enabled.

The rear panel has a power jack for the included 5 Volt power supply and a DB9 serial port which accept commands from the included SOF8 409 software where the table is loaded into RAM. This is an example of the AC rear panel option because it is equipped with two SMA connectors label "TS" and "IOUD."

Operating table mode requires that a set of values for each output be entered in a command sequence like the one you see here. All values are entered in HEX and each output is defined by the channel, its location in RAM, frequency, phase, amplitude and dwell time. Each output is entered in pairs for both channel 0 and 1, and is called a profile point. With a capacity of 15 bits 32,728 profile points can be loaded into a given table and stored in RAM. The dwell time on the last entry must be either "00", to loop and repeat the table, or "FF" to stop the table which will cause the last entry to persist.

The SOF8 409 software allows you to create a text file of your profile points in decimal and converts them to HEX as it loads your table into RAM. It is important to note, that a text editor must be used that creates a .txt file. In this example, we were using Microsoft Notepad.

Prior to entering any table into RAM, first go to the command tab and enter "M", space, "0". This stops any prior table from running and prepares for loading a new file. Then go to File, "Load from File to Ram Table". You will choose your appropriate decimal formatted table and you will open it. Then, you will see how it converts from decimal into HEX and loads it into the RAM. Then go to Command tab, Enter "M", space "T" and this begins your table.

This is an oscilloscope capture of the outputs in our table for channel 0. As the table steps from one profile point to the next, you can see how the frequency changes in a phase continuous manner. In order to operate table mode with external timing, the table must be set up specifically such that the dwell time for each profile point is HEX FF or decimal to 255. This allows each output to persist until the next profile point is stepped into. Also the last profile point of the table must have a dwell time of 0-0. This signifies the end of the table and allows the table to loop.

Now we will demonstrate the use of external timing using the software trigger. Entering the command "TS" changes the frequency from 10 MHz to 5 MHz. Each subsequent TS command steps to the next profile point in the table. When using the TS command there's a latency of 100 microseconds.

To operate external timing of table mode using the TS external trigger, connect an SMA coaxial cable to a falling edge 3-volt signal. Each falling edge will step to the next profile point in the table. This is a demonstration of using the TS external trigger and, like the TS software command, there is 100 microsecond delay from signal to output.

You can also control the timing of your table using the IOUD external trigger. This function is designed for better synchronization of signal to output due to its reduced latency of 100 nanoseconds.

With your table running, this mode is enabled by entering the command "I", space, "E". Once this is done, each subsequent TS software command, or falling edge 3 volt signal on the TS external trigger prompts the device to wait for a rising edge 3 volt signal on the IOUD external port. This in turn steps to the next profile point on the table within 100 nanoseconds.

Thank you for watching this Novatech Instruments video. Please feel free to contact us with any questions and visit our website Novatechsales.com for full product information and documentation.

For additional information on the table mode see the 409B hardware manual paragraph 8 and the SOF8_409B software manual paragraph 7.2

The presenter is Andy Syltebo, a senior in electrical engineering at Western Washington University. Andy produced this video when he worked for Novatech Instruments as a summer intern in 2017. He set up and operated all the instrumentation, operated the video camera and edited the video.