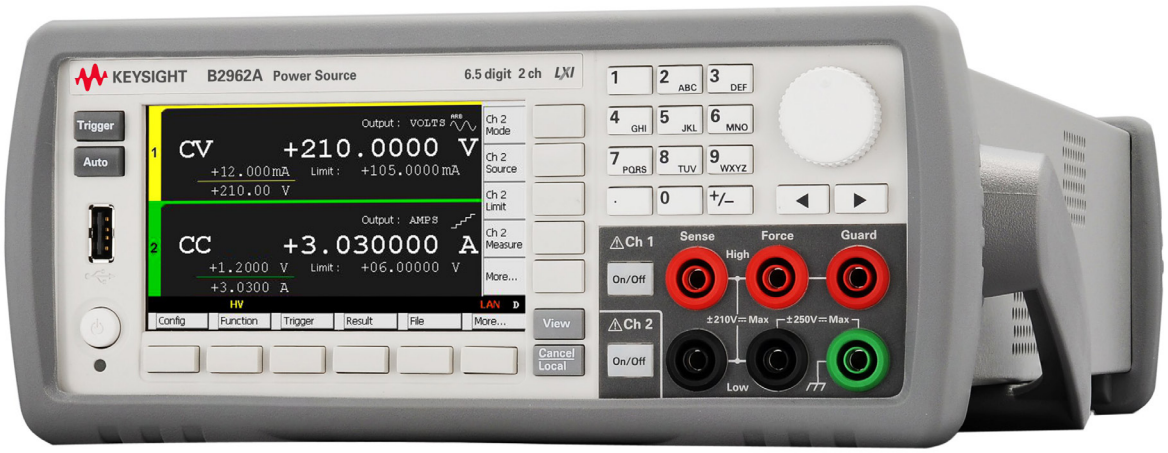
Keysight Technologies

Using an External Trigger to Generate Pulses with the B2960A

B2960A 6.5 Digit Low Noise Power Source

Demo Guide



KEYSIGHT TECHNOLOGIES

Unlocking Measurement Insights

Introduction

The Keysight B2960A 6.5 Digit Low Noise Power Source is a bench-top power supply with revolutionary capabilities and functions not previously available. It can generate either voltage or current with 6.5 digits of resolution while also monitoring them, which is essential for a variety of measurement applications.

It also has an arbitrary waveform generation function that allows it to generate current/voltage waveforms in formats such as sinusoid, square, trapezoid, ramp, triangle, and exponential. In addition to these commonly used waveforms, user-defined arbitrary waveforms with up to 100,000 points can be specified. These flexible output capabilities permit more thorough evaluation of circuits/devices/samples than are possible with other instruments such as power supplies and sources.

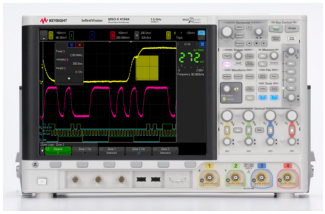
This demonstration guide highlights the excellent pulsed signal output function and the triggering capability via the B2960A series' digital I/O signal port. The methodology involves setting the pulse response of the B2960A series source to an external trigger signal from a device-under- test (DUT). For example, the B2960A can be programmed to respond to an external trigger with 2 V pulses with a 300 µs pulse delay and 200 µs pulse width. Real-time waveform monitoring is possible by adding an oscilloscope to the test setup.

Required Instrument and Accessories

All of the accessories required to perform the demos described in this demonstration guide are provided in a demo kit that is included with Keysight B2962A demo units except for the N1294A-031 and an oscilloscope. The kit includes items such as a Combo Test Lead Kit, and a resistor.

Keysight B2961A/62A 6.5 Digit Low Noise Power Source

U8201A Combo Test Lead Kit



Keysight Oscilloscopes (MSO-X 4000 Series is shown)

N1294A-031 GPIO - BNC Trigger Adapter

1.1 kΩ Resistor

Concept

Figure 1 illustrates the connection diagram and basic setup conditions used in the demo to make the B2960A series generate pulses whenever it receives an external trigger signal. Use the settings shown below to program the B2960A source. Connect an oscilloscope to the test setup to monitor the results.

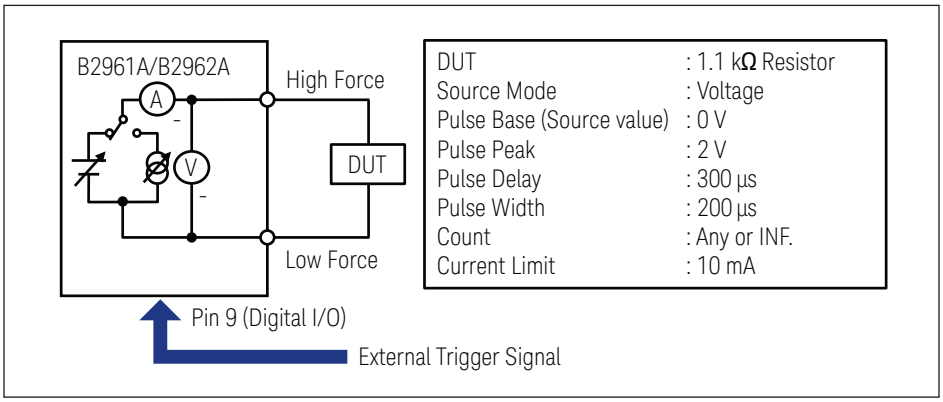


Figure 1. Connection diagram and basic condition

Figure 2 shows the parameters used to define the timing parameters of the pulses from the instrument's front panel. Once these parameters have been specified, the source value is output immediately after pressing On/Off. Next, after configuring an appropriate trigger condition and initiating the channel, the instrument will be ready to receive an external trigger signal and generate pulsed output.

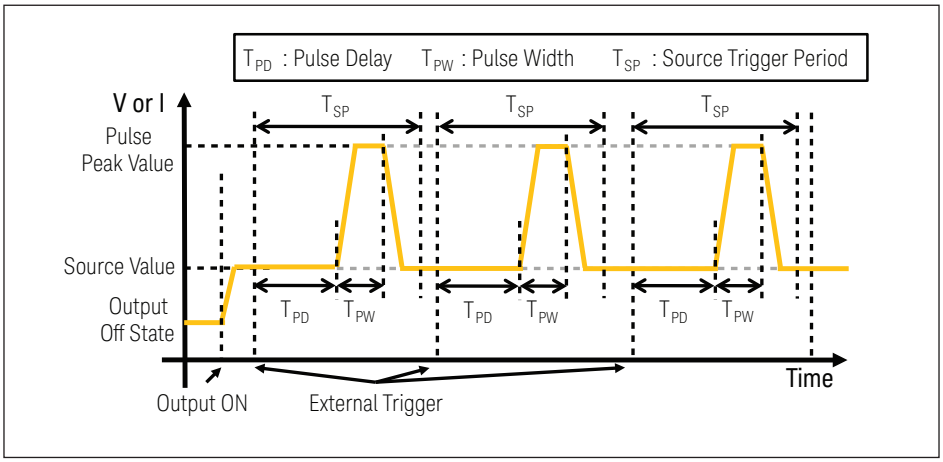


Figure 2. Timing chart for the pulsed outputs

Figure 3 shows the external trigger signal requirements to initiate device action on the B2960A series. Positive or negative logic can be used.

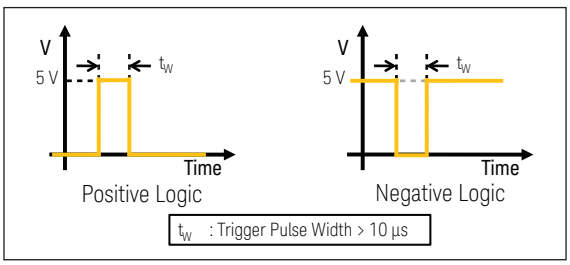
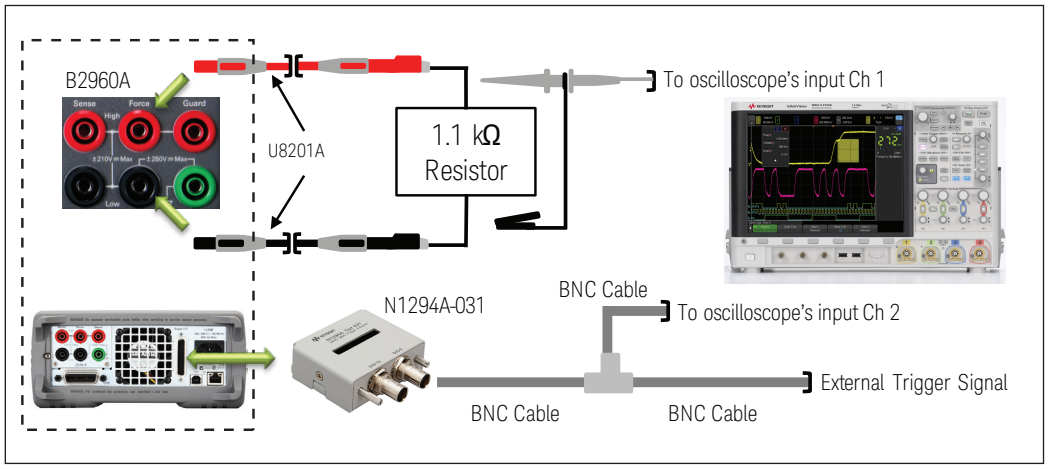


Figure 3. External trigger signal requirements

Setup

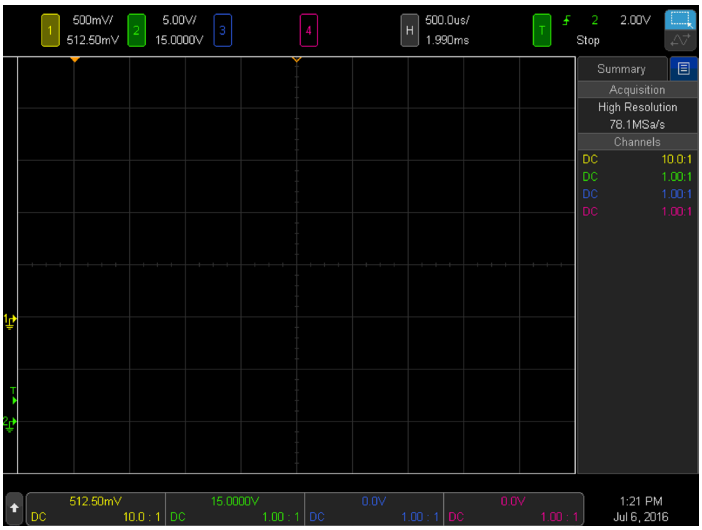
Connection

1. Connect the **black banana cable** of the U8201A to the B2960A's **Ch1 Low Force** Terminal.
2. Connect the **red banana cable** of the U8201A to the B2960A's **Ch1 High Force** Terminal.
3. Clip the **end of the 1.1 kΩ** resistor with the **black alligator clip** of the U8201A.
4. Clip the **other end of the 1.1 kΩ** resistor with the **red alligator clip** of the U8201A.
5. Probe across the **1.1 kΩ resistor** to monitor the output using the **oscilloscope's Ch1**.
6. Connect the **Pin 9** of the B2960A's Digital I/O Port to the **external trigger signal source** and the oscilloscope's Ch2 using the BNC cables, the N1294A-031, wiring, etc.



Oscilloscope setup

1. Set the **Ch1 vertical scale** to **500 mV/div**.
2. Set the **Ch2 vertical scale** to **5 V/div**.
3. Set the **horizontal scale** to **500 µs/div.**



LAB: Using external trigger signals and B2960A series power source to analyze a device-under-test (DUT)

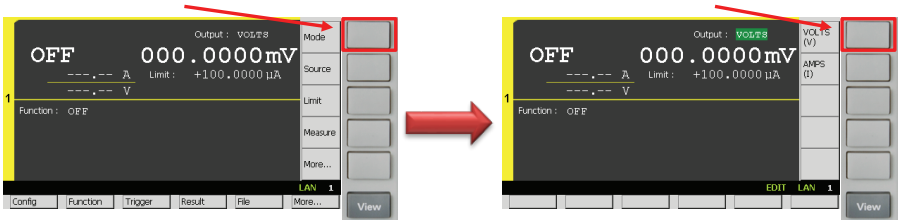
Demonstration

1. Change View mode to Channel 1 Single View

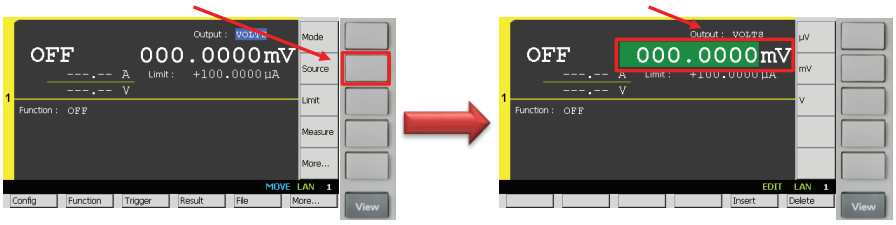
1) Press View repeatedly until the Channel 1 **Single View** appears on the screen.

2. Configure the pulse condition

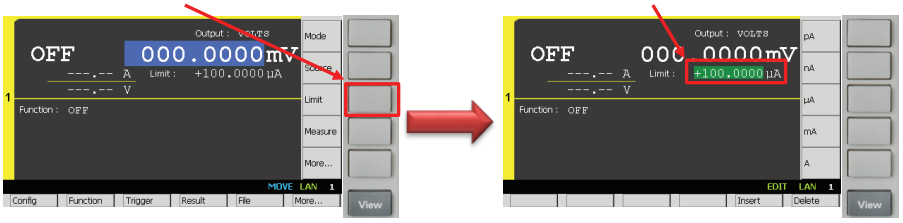
1) Press Mode to edit the **Source function**, and then select VOLTS (V) to set the **Source function** to **Voltage source**.



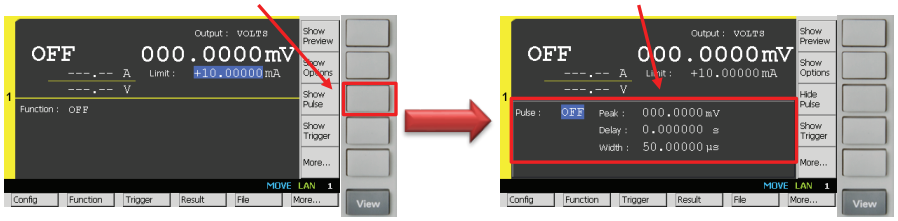
2) Press Source to edit the **Source value**, and then enter **0 V** to set the **Source value** to **0 V.**



3) Press Limit to edit the **Limit value**, and then enter **10 mA** to set the **Limit value** to **10 mA**.



4) Press More... to change the keys shown in Assist keys, and then press Show Pulse to show the **Pulse Sub-Panel**.



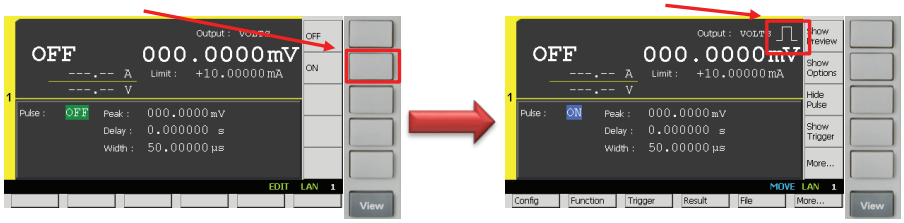
Objective

This demo illustrates the ability of a B2960A series power source to respond to an external trigger with pre-specified settings: Pulse voltage, pulse delay and pulse width

Procedure

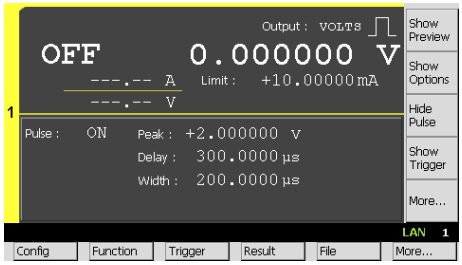
1. Change View mode to Channel 1 Single View
2. Configure the pulse condition
3. Configure the trigger condition
4. Disable an internal source wait time
5. Initiate the channel to wait for an external trigger signal
6. (Optional) Abort the channel to stop waiting for an external trigger signal

5) Press  , then press ON to turn on **Pulse source mode**. After turning on the **Pulse source mode**, you can see the **Source Shape** which shows the pulse source mode enabled.



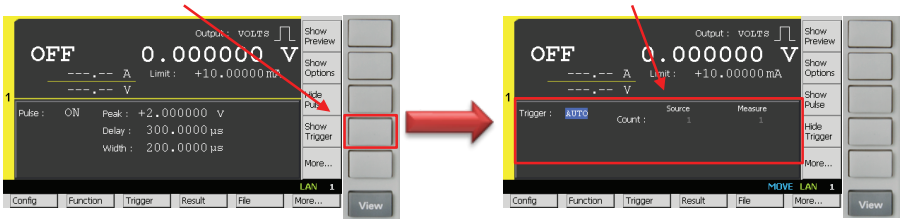
6) Rotate  to select Channel 1 Pulse Parameters and set them up as below.

(Peak: 2 V, Delay: 300 µs, Width: 200 µs)

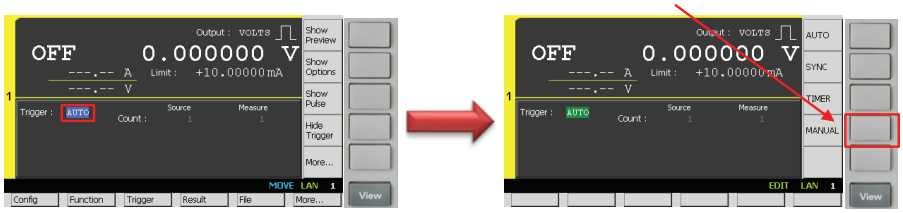


3. Configure the trigger condition

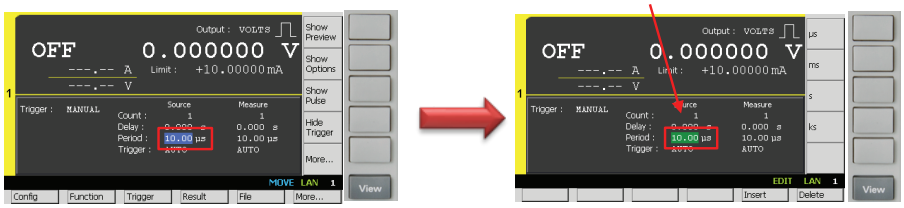
1) Press Show Trigger to show the **Trigger Sub-Panel**.



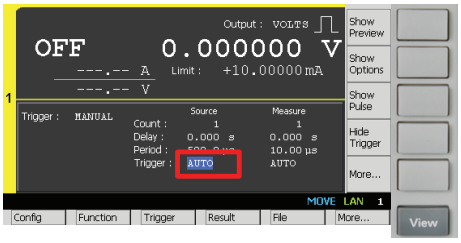
2) Rotate  to edit the **Trigger type,** and then select MANUAL to set the **Trigger type** to **MANUAL**.



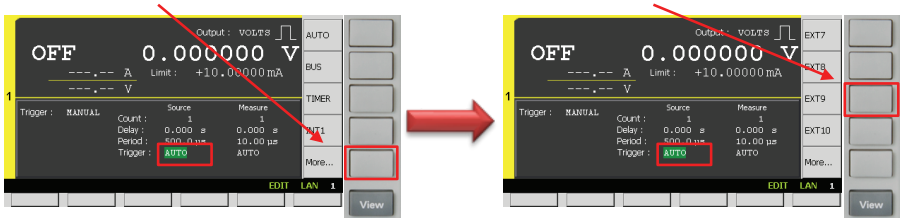
3) Rotate  to select the **Source trigger period** and press  to edit it. Then enter **500 µs** to set the **Source trigger period** to **500 µs**, which is the sum of the pulse delay and the pulse width.



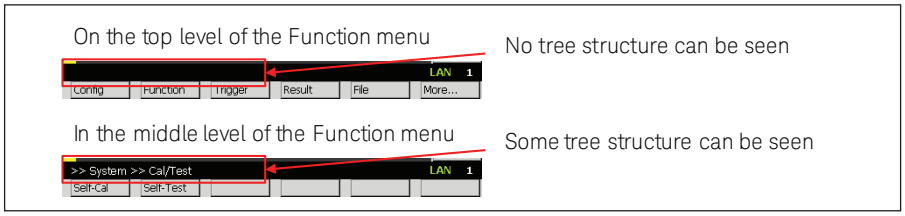
4) Rotate  to select the **Source trigger source** and press  to edit it.



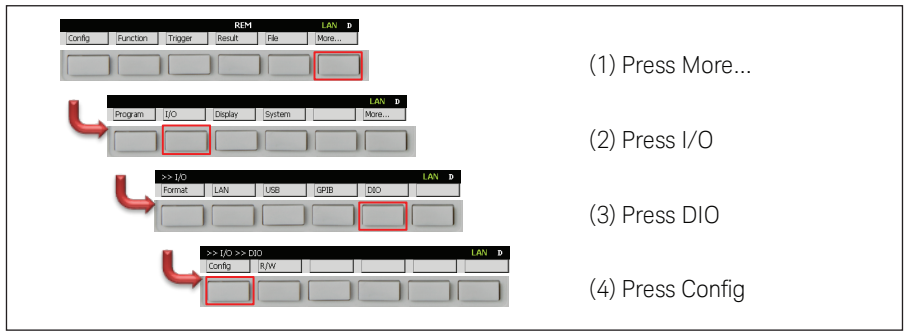
5) Press More... to change the keys shown in Assist keys, and then press EXT9 to set the **Source trigger source** to **EXT9**.



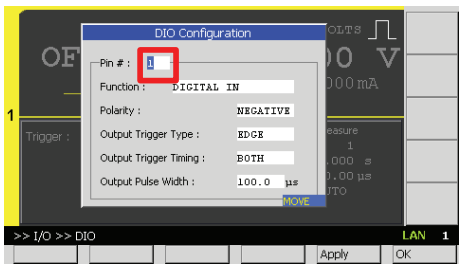
6) If you aren't on the top of the Function menu, press Cancel Local repeatedly to return to the top level.



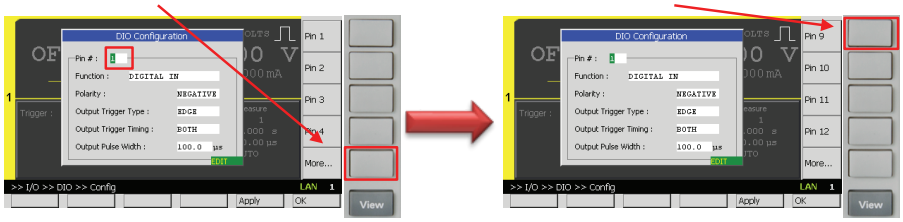
7) Press More... , I/O , DIO , and then press Config to open the **DIO Configuration dialogue**.



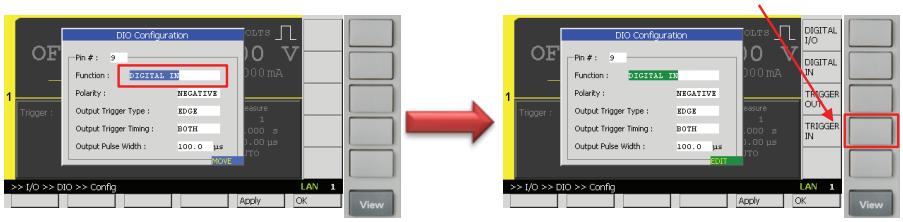
8) Press  to edit the **Digital I/O pin number**.



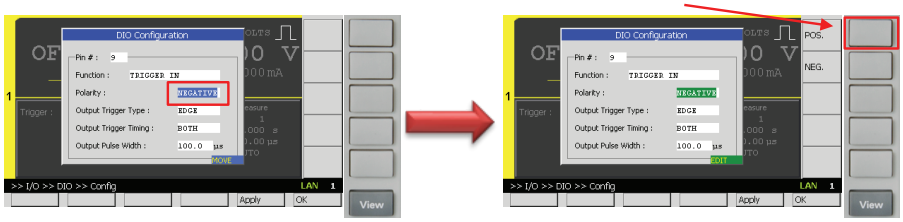
9) Press [More...] repeatedly until [Pin 9] appears in the Assist keys and then select [Pin 9] to specify the **Digital I/O pin number**, the properties of which are configured.



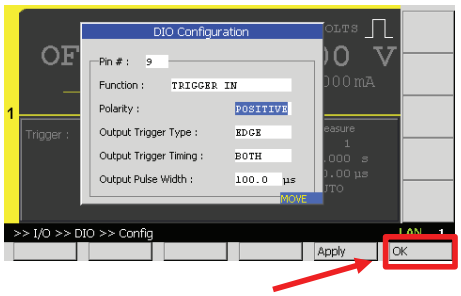
10) Rotate  to select the **Input/output function** and press  to edit it. Then press [TRIGGER IN] to set it to **Trigger input**



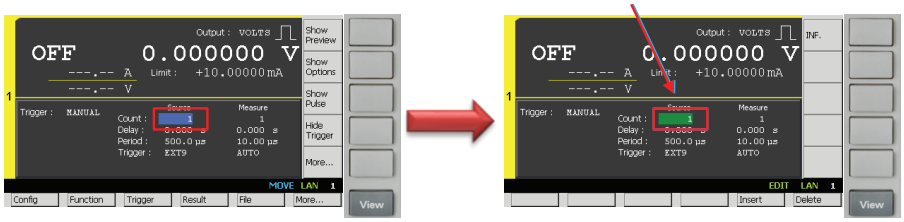
11) Rotate  to select the **Polarity** and press  to edit it. Then press [POS.] to set it to **Positive polarity**.



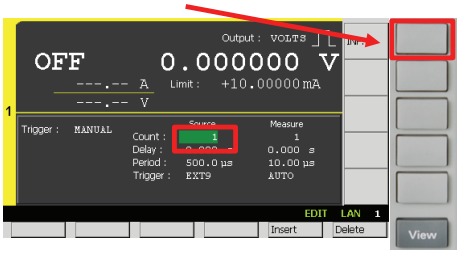
12) Press [OK] to save your settings.



13) Rotate  to select the **Source trigger count** and press  to edit it. Then enter the **Number of trigger signals** which will be sent to the instrument as the **Source trigger count**.



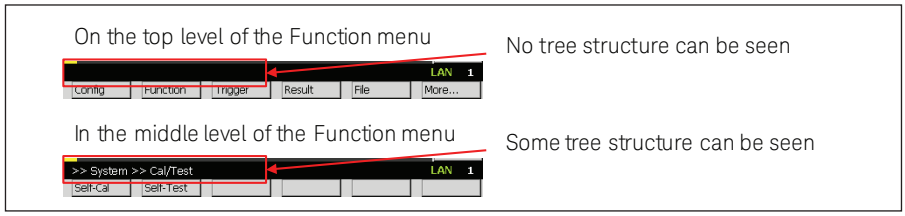
14) Or press INF. to set it to **INFINITY** if you'd like to continue to source pulses. If you set the trigger count to INFINITY be sure you abort the process at the end of the test.



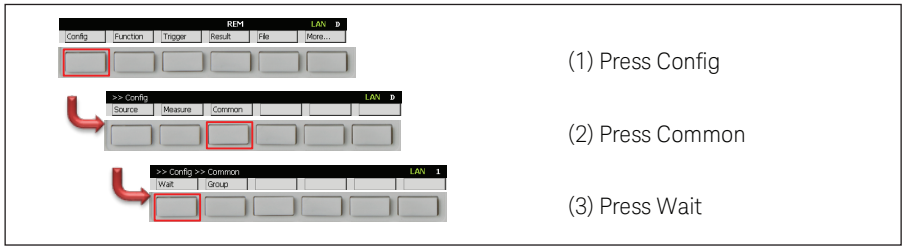
4. Disable an internal source wait time

The B2960A series has internal wait time parameters to adjust the timing to source and measure in order to have the measurements made under the exact source condition as specified. However, it is required to disable it to source pulses at the exact timing as specified by external trigger signals

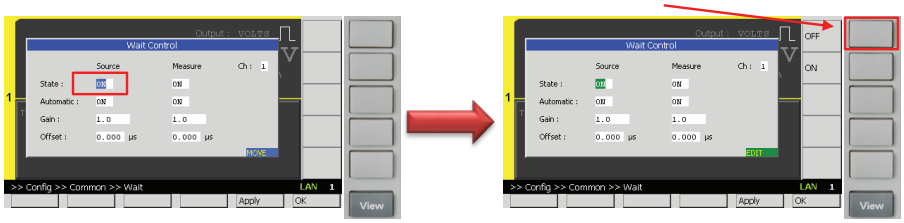
1) If you aren't on the top of the Function menu, press Cancel Local repeatedly to return to the top level.



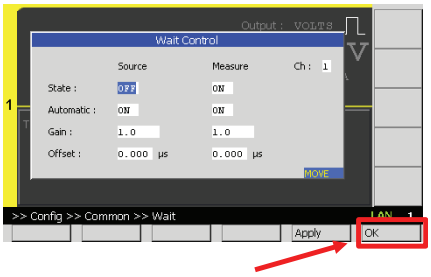
2) Press Config , Common , and then press Wait to open the **Wait Control dialogue.**



3) Press and select OFF to disable the **Source wait time**.



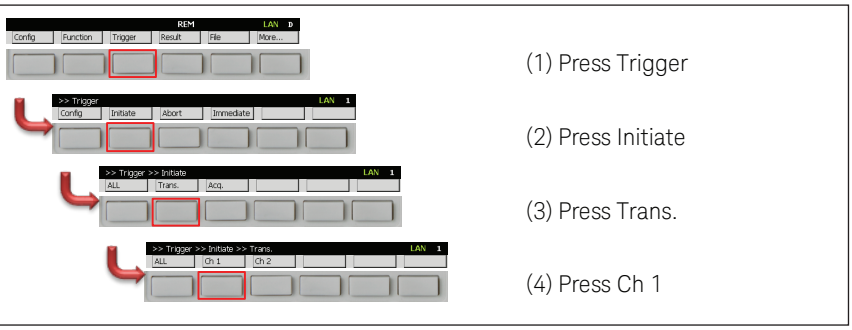
4) Press OK to save your settings.



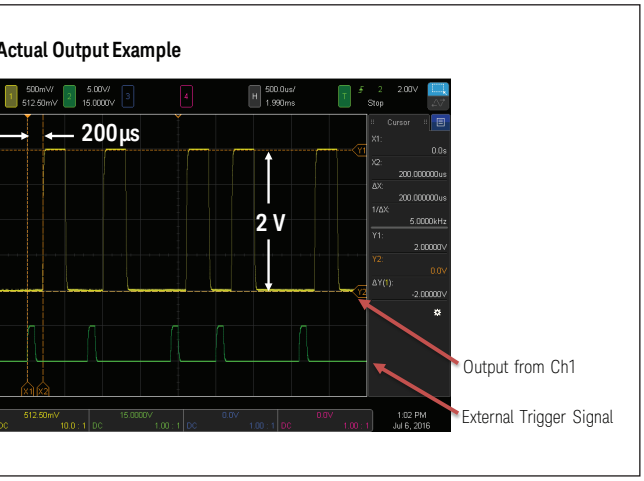
5. Initiate the channel to wait for an external trigger signal

1) If you aren't on the top of the Function menu, press Cancel Local repeatedly to return to the top level.

2) Press Trigger, Initiate, Trans., and then press Ch 1 to make the channel 1 be ready to receive an external trigger signal.



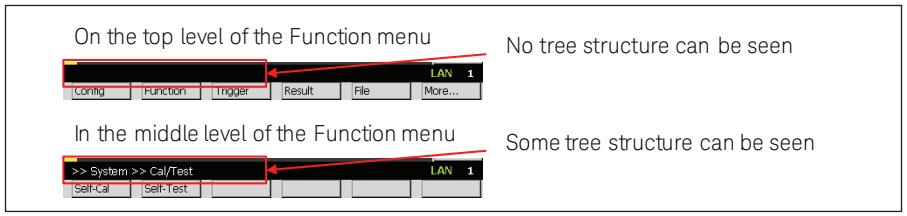
Now, the B2960A series is ready to receive an external trigger signal. Send the external trigger signal to the B2960A series to generate a pulsed signal.



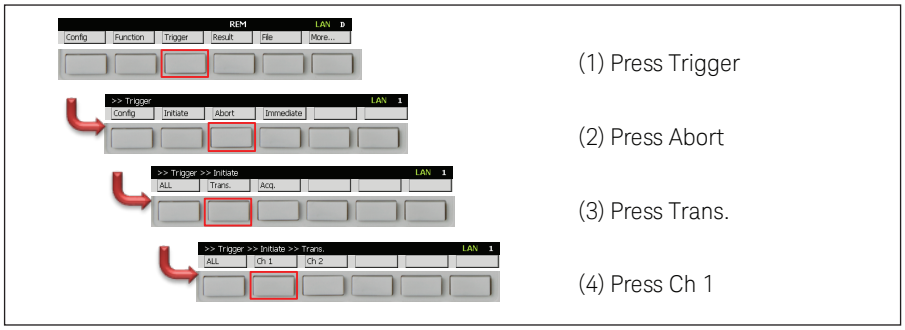
6. (Optional) Abort the channel to stop waiting for an external trigger signal

If you set the source trigger count to INFINITY, or the number of external trigger signals was less than the specified source trigger count, you will need to abort the process.

1) If you aren't on the top of the Function menu, press Cancel Local repeatedly to return to the top level.



2) Press Trigger, Abort, Trans., and then press Ch 1 to make the channel 1 stop waiting for an external trigger signal.



Conclusion

The Keysight B2960A 6.5 Digit Low Noise Power Source is a bench-top power supply with revolutionary capabilities and functions not previously available. It can source either voltage or current with 6.5 digits of resolution while also monitoring them, which is essential for a variety of measurement applications.

In addition to an arbitrary waveform generation function that allows it to source current/voltage waveforms in a variety of formats, the B2960A series also has excellent pulsed signal output function and the triggering capability via its digital I/O signal port.

Configuring the B2960A series properly enables you to use an external trigger to generate pulses to evaluate and analyze a device-under-test (DUT). The addition of an oscilloscope to the test setup allows you to monitor and analyze the waveforms.

B2900 Precision Instrument Family

The B2900 family contains products that perform both precision sourcing and precision measurement. **www.keysight.com/find/b2900a**

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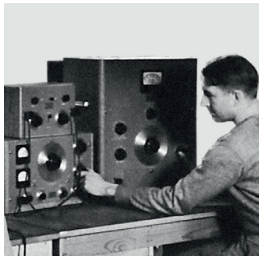

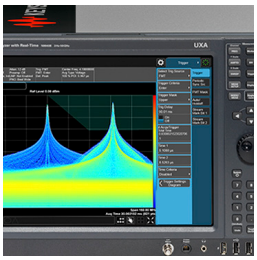

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