

Dual-View Oscilloscope User's Manual

Siva Gangavarapu

Siva Gangavarapu
Oscilloscope PCB

Prototyping Area

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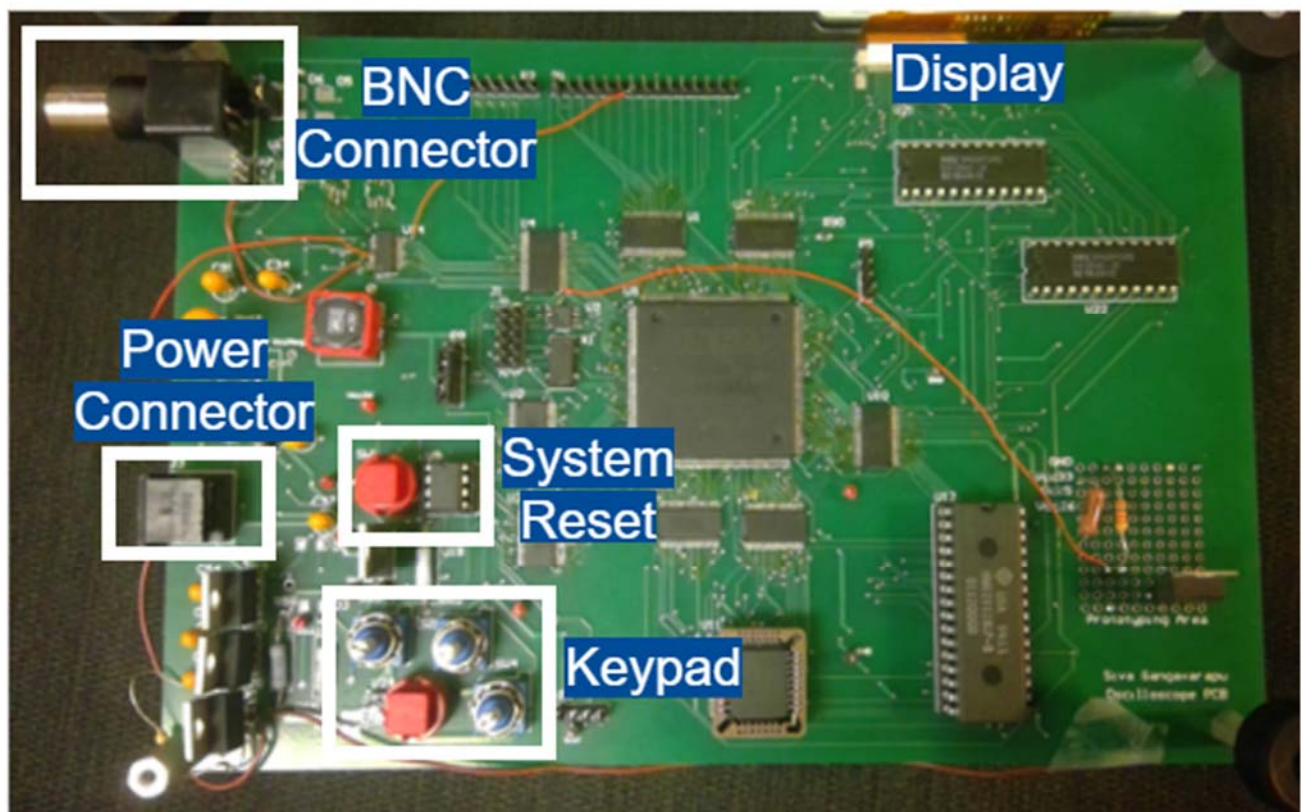
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Introduction

Welcome to the Dual-ViewOscope user's manual, where you will find detailed documentation regarding the features and functionality of the Dual-ViewOscope, as well as help for troubleshooting. For the safety of the system, please carefully read through this entire manual before operating the system.

The Dual-ViewOscope oscilloscope is a standalone system that is powered entirely by the included power connector. Study the following diagram to get an overview of the Dual-ViewOscope hardware.

Dual-ViewOscope



Dual-ViewOscope Layout Overview: Diagram showing the locations of major Dual-ViewOscope hardware features. The display is connected externally, and is not actually shown in this diagram.

Features of the Dual-ViewOscope include the following:

- Singular power supply
- 8-bit color Display
- Standard BNC Cable support
- Simple and ergonomic keypad, including non-incremental rotary switches to allow for smooth operation
- Triggering (including options for adjusting trigger level, delay, mode, and slope)

These features will be explored further in the “Features and Functionality” section of this manual on page 5. In addition to these features, the system is probably most notable for its ability to plot the desired waveform slightly more than two times on the display. This is more than what most leading oscilloscopes are capable of, giving the Dual-ViewOscope an edge during crucial analog signal measurement procedures.

The next section will give provide instructions for setting up your Dual-ViewOscope system.

Set-Up

Your Dual-ViewOscope should come with two components: A Dual-ViewOscope standalone oscilloscope, and a power connector. Please verify that both of these parts are present. The following instructions will guide you through setting up your new hardware:

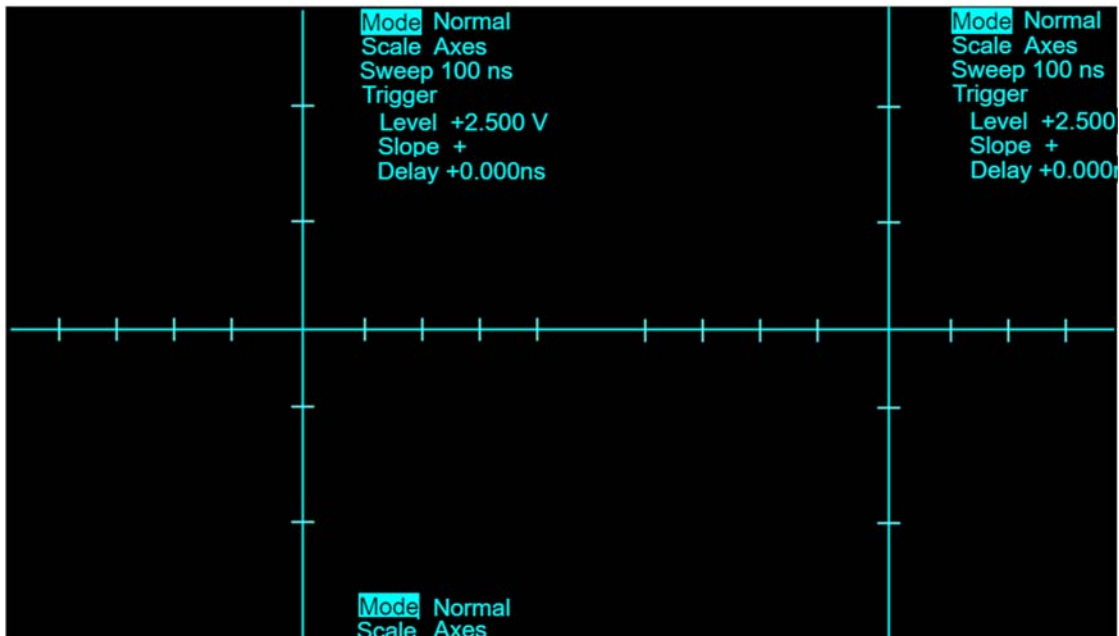
- Remove the Dual-ViewOscope from the provided anti-static bag, which protects the system from ESD events.

Once you are done using the Dual-ViewOscope, ensure that it is safely returned to the anti-static bag.

- Set the Dual-ViewOscope on a flat surface. Care that the system is resting on a firm surface, since the legs are very loosely attached and should not be relied up on for stability on an uneven surface.
- Set the external display on a flat surface

Care not to place the display on the board, as the metal edges of the display can cause problems with the board circuitry

- Connect the power connector into the appropriate port on the Dual-ViewOscope (marked *Power Connector* on the diagram on page 3)
- Plug in the power connector into a standard AC outlet, and ensure that it is powered on. If the system has been powered correctly, it will automatically turn on. This can be verified by checking the display, which should depict the following (an explanation of the display layout can be found in the Features and Functionality section):



- As seen in the diagram, upon power-on the system is initialized in one-shot trace mode with a sampling rate of 100 ns, trigger level of 2.50 V, no trigger delay, and positive trigger slope with the menu and axes displayed.
 - These features will also be further explained in the Features and Functionality section on the following page.
- Connect the male end of a standard BNC connector (not included) into the appropriate port on the Dual-ViewOscope (marked *BNC Connector* on the diagram on page 3)
- You are now ready to start measuring and displaying waveforms on your Dual-ViewOscope!

Features and Functionality

Analog Input

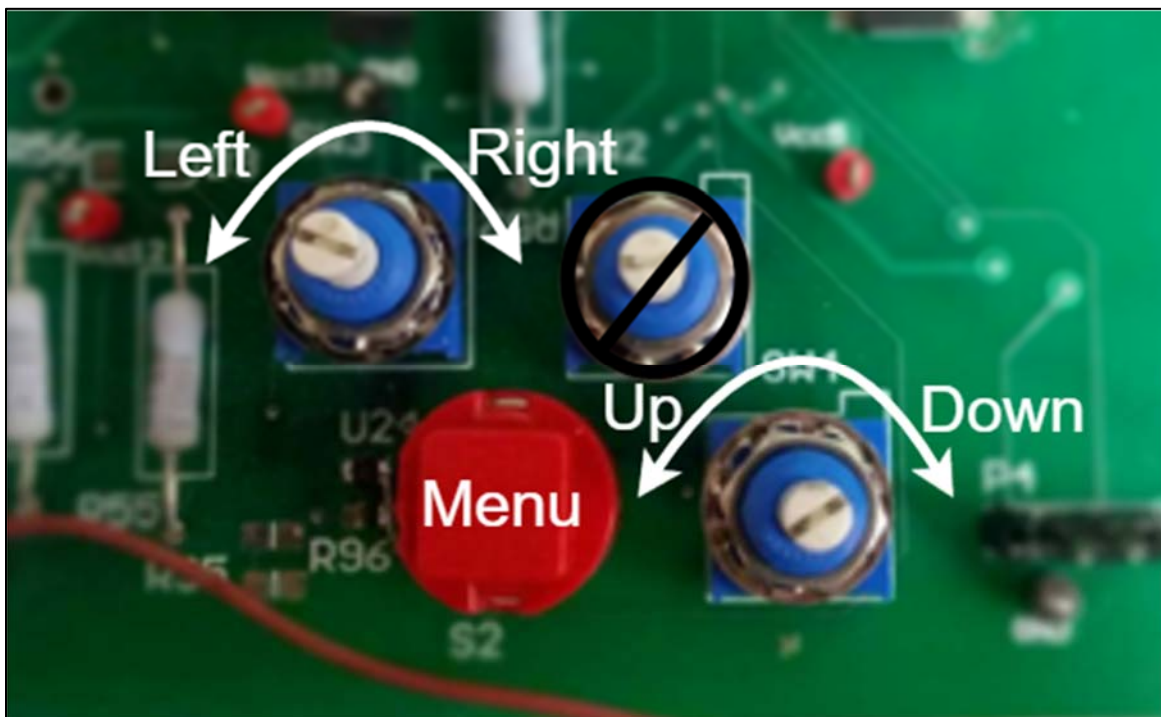
- The Dual-ViewOscope can receive and display any analog input between 0 and 3 V.

Using the product with a signal outside this range may seriously damage it beyond repair, so please exercise caution.

- The Dual-ViewOscope has a bandwidth limitation of 5 MHz.
- To display a signal, ensure that the BNC cable (not included) is connected to the appropriate connector in the oscilloscope, simply connect the other end of to the desired signal source. If the connection is secure, the signal waveform should appear immediately on the display

Keypad

- The following diagram shows an overview of functionality of the keypad, which is used to navigate the display



Dual-ViewOscope Keypad Layout: Diagram showing the function of the different keypad buttons, including rotary and push-button switches. Only two of the three rotary switches are used, as the third one is non-operational.

- Left/Right Rotary Switch
 - This switch is used to choose between the different options in the menu entry that is currently selected by the cursor.

The left command will cycle through the list of menu options “backwards,” i.e. to a lower value (when applicable). Once the option selected is at the beginning of the list, attempting to turn the switch left will have no effect

The right command will cycle through the list of menu options “forwards,” i.e. to a higher value (when applicable). Once the option selected is at the end of the list, attempting to turn the switch right will have no effect

- Up/Down Rotary Switch
 - This switch is used to choose between selecting the different menu entries. The currently selected menu entry will be marked by a cursor. Individual menu entries are described in greater detail below.

If the menu entry at the top or bottom of the menu list is currently selected, attempting to move cursor up or down, respectively, will have no effect on the cursor position.

- Menu Push-Button Switch
 - This switch is used to toggle between having the menu shown or hidden on the display.
 - Upon system startup, the display will automatically turn on with the menu shown.

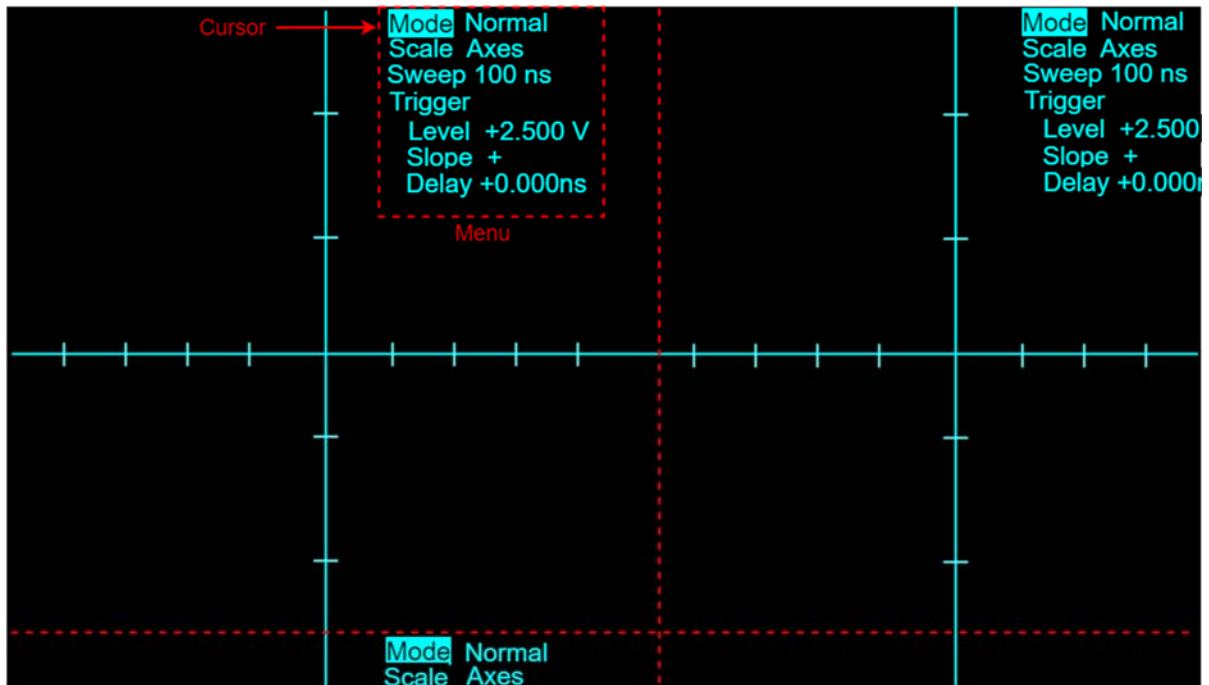
When the menu is hidden, using the left/right or up/down rotary switches will have no effect until the menu is toggled back to being visible.

Reset

- In order to initiate a system wide reset, press the red reset button once (location shown as “System Reset” in the diagram on page 3)

Display

- As mentioned earlier, the Dual-ViewOscope dual-viewing technology (patent pending) allows the user to view the intended waveform multiple times on the display. The following diagram gives an overview of the display layout.



Dual-ViewOscope Display Layout: Overview of the display with menu and axes shown. Red dotted lines do not actually appear in the display. This diagram also shows the parameters that are set upon scope power-on.

- The red dotted lines show the location of the display menu and the demarcation of the display into multiple “mini-displays,” the namesake feature of the Dual-ViewOscope. Traces that appear in the upper left “mini-display,” which is the only display that is fully shown, will also appear in the upper right “mini-display,” which is never fully shown. The menu and cursor locations will also be identical.
 - In this particular display layout, the Mode menu entry is selected, since the cursor is located on it.

Display Menu

- The keypad section provides instructions regarding the operation of the display menu.
- All Dual-ViewOscope system parameter values, for both the display and trigger mechanism, are controlled through operation of the display menu.
- The left side of the menu lists the menu entries, and the right side lists their respective values (when applicable)
- The options for the different values of each individual menu entry are presented in this manual in the order that they are cycled through on the Dual-ViewOscope menu

Display Menu Options

Trigger Mode

- The first option on the menu is Mode, the trigger mode entry, which allows the user to adjust the trigger mode for the oscilloscope based on the three following options
 - Mode Normal –display updates the waveform every time a trigger event occurs

- Mode Automatic –display updates the waveform in the same way as Mode Normal, except the scope will also update the display with a new trace even without an actual trigger event, after a slight delay
- Mode One-Shot –after a trigger event, display shows the waveform and does not change. In order to update the display with another trace, refer to the Trigger Re-Arm section below.

Display Scale and Axes

- The second option on the menu is Scale, the display scale and axes entry, which allows control over the axes and grid display. Options include Scale Axes, Scale Grid, and Scale Off
 - Scale Axes – the waveform is displayed on top of x and y axes (shown on page 9)
 - Scale Grid – the waveform is displayed on top of x and y axes and an x-y grid
 - Scale None –the waveform is displayed with no axes or grid

Sweep Rate

- The third option on the menu is Sweep, the sweep rate entry, which allows the user to specify the sweep rate of the Dual-ViewOscope.
 - The sweep rate is shown in units of time per sample
 - The following list gives the possible options of the sweep rate. The sweep rate cannot be set to a value other than these: 100 ns, 200 ns, 500 ns, 1 us, 2 us, 5 us, 10 us, 20 us, 50 us, 100 us, 200 us, 500 us, 1 ms, 2 ms, 5 ms, 10 ms, 20 ms (units of time/sample)

Trigger Re-Arm

- The fourth option on the menu is Trigger, the trigger re-arm entry, which allows the user to re-arm the scope trigger while operating in one-shot mode
 - When the Mode entry is set to Mode One-Shot, turning the left/right key in either direction while selecting the Trigger entry will reset the trigger mechanism to be triggered and display a new waveform on the display.
 - When the Mode is in either Mode Normal or Mode Automatic, the Trigger menu entry will not do anything.

Trigger Level

- The fifth option on the menu is Level, the trigger level entry, which allows the user to specify the trigger level for the Dual-ViewOscope.
 - The trigger level determines the input voltage value at which the Dual-ViewOscope will have a trigger event.
 - The trigger level can be adjusted to a value between the most negative input voltage, and the most positive.
 - The trigger level can be adjusted within this range in 128 increments

- When the trigger level is being changed, the trigger level is displayed as a horizontal line.

The trigger level has a minimum value of 0 V, and a maximum value of 5 V. Since the analog input voltage range is between 0 and 3 V, these limits should never be exceeded.

Trigger Slope

- The sixth option on the menu is Slope, the trigger slope entry, which allows the user to specify the trigger slope for the Dual-ViewOscope
 - Slope can be set to either Slope +, for positive slope, and Slope –, for negative slope.
 - When set to Slope+, the trigger event will occur on a positive slope.
 - When set to Slope-, the trigger event will occur on a negative slope.

Trigger Delay

- The seventh and final option on the menu is Delay, the trigger delay entry, which allows the user to specify the trigger delay for the Dual-ViewOscope
 - The delay determines the time after a trigger event occurs that the trace for the waveform should start being displayed.
 - The trigger delay that is shown on the menu is calculated using the following formula
 - $\text{Trigger delay (units of time)} = (\text{delay time}) * \text{sample rate}$
 - The delay time has a minimum value of 0 (no delay) and maximum value of 50000.

Troubleshooting

- Most troubleshooting errors, which most includes unresponsive keypad behavior, can be solved by initiating a system-wide reset (see page 6 of the manual)
 - These troubleshooting errors should not occur frequently. If they are, please contact the manufacturer.
- If software is still unresponsive, initiate a power cycle to completely reboot the system.