VOLTCRAFT DSO-2104

VOLTCRAFT DSO-2104 Digital Oscilloscope User Manual

Model: DSO-2104

1. Introduction

The VOLTCRAFT DSO-2104 is a high-performance 100 MHz, 4-channel digital oscilloscope designed for precise signal analysis in various applications. It features a clear 7-inch LCD display with 800 x 480 pixels resolution, a maximum sampling rate of 1 GSa/s, and 8-bit vertical resolution. This instrument is ideal for engineers, technicians, students, and hobbyists requiring reliable and accurate waveform measurements. This manual provides essential information for the safe and effective use of your DSO-2104 oscilloscope, including setup procedures, operating instructions, maintenance guidelines, and technical specifications. Please read this manual thoroughly before operating the device.

2. Safety Information

WARNING:

- The protective earth conductor must be connected to prevent electric shock.
- There are no user-serviceable parts inside the device. Do not remove any covers.
- Always entrust maintenance and repair work to qualified service personnel.
- Read the operating instructions completely before using the device.

- Ensure the power supply voltage matches the requirements specified on the device label (100-240V, 50/60Hz).

Failure to follow these safety instructions may result in electric shock, fire, or damage to the device.

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3. Product Overview

3.1 Front Panel

The front panel of the DSO-2104 features the main display, control buttons, and input channels. Familiarize yourself with these components for efficient operation.

Figure 3.1: Front view of the VOLTCRAFT DSO-2104 Digital Oscilloscope, showing the display, control knobs, and BNC input connectors for channels 1-4.

Key components include:

- **7-inch LCD Display:** Shows waveform data, measurement results, and menu options.
- **Channel Input Connectors (CH1, CH2, CH3, CH4):** BNC connectors for connecting oscilloscope

probes.

- **Vertical Control Knobs:** Adjust voltage scale and position for each channel.
- **Horizontal Control Knobs:** Adjust time base and horizontal position.
- **Trigger Controls:** Set trigger level, mode, and type.
- **Function Buttons:** Access various menus and settings (e.g., Measure, Acquire, Utility, Cursor, Auto, Run/Stop).

3.2 Rear Panel

The rear panel provides power input and connectivity options.

Figure 3.2: Rear view of the VOLTCRAFT DSO-2104 Digital Oscilloscope, showing the power input, USB port, and ventilation.

- **Power Input:** Connect the provided power cable.
- **USB Port:** For data storage and connection to a PC.
- **Ventilation Grilles:** Ensure these are not obstructed to prevent overheating.

3.3 Side View

The side view illustrates the ergonomic design and form factor of the oscilloscope.

Figure 3.3: Side view of the VOLTCRAFT DSO-2104 Digital Oscilloscope, highlighting its compact design.

4. Setup

Follow these steps to set up your DSO-2104 oscilloscope for initial use:

1. **Unpacking:** Carefully remove the oscilloscope and all accessories from the packaging. Verify that all components are present and undamaged.
2. **Power Connection:** Connect the provided power cable to the power input on the rear panel of the

oscilloscope and then to a suitable AC power outlet (100-240V, 50/60Hz). Ensure the power outlet is properly grounded.

3. **Probe Connection:** Connect the oscilloscope probes to the desired BNC input channels (CH1, CH2, CH3, CH4) on the front panel. Ensure a secure connection.
4. **Probe Compensation:** Before taking measurements, it is recommended to compensate your probes. Connect the probe to the probe compensation output (usually a square wave signal) and adjust the probe's compensation trimmer until a flat-top square wave is displayed on the screen.
5. **Power On:** Press the power button, typically located on the front panel, to turn on the oscilloscope. The display will illuminate, and the system will boot up.

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5. Operating Instructions

The DSO-2104 offers a range of functions for waveform analysis. Here are basic operating guidelines:

5.1 Basic Measurements

- **Bandwidth:** The device operates at a 100 MHz bandwidth across 4 channels.
- **Sampling Rate:** The maximum sampling rate is 1 GSa/s, allowing for detailed capture of fast signals.
- **Vertical Resolution:** With an 8-bit vertical resolution, the oscilloscope provides good precision for voltage measurements.
- **Display:** Waveforms are displayed on the 7-inch (17.78 cm) LCD screen (800 x 480 pixels).

5.2 Adjusting Waveforms

- **Vertical Scale (Volts/Div):** Use the vertical control knobs for each channel (CH1-CH4) to adjust the voltage scale, changing the vertical amplitude of the displayed waveform.
- **Vertical Position:** Use the position knobs to move the waveform vertically on the screen.
- **Horizontal Scale (Time/Div):** Use the horizontal control knob to adjust the time base, changing the horizontal compression or expansion of the waveform.
- **Horizontal Position:** Use the horizontal position knob to shift the waveform left or right.

5.3 Triggering

Triggering stabilizes repetitive waveforms and captures single-shot events.

- **Trigger Level:** Adjust the trigger level knob to set the voltage point at which the oscilloscope will trigger.
- **Trigger Mode:** Select different trigger modes (e.g., Edge, Pulse, Video) using the dedicated trigger buttons or menu.
- **Frequency Counting:** The oscilloscope includes a frequency counting function for precise frequency measurements.

5.4 Data Storage and Recall

- **USB Interface:** The integrated USB port allows for convenient data storage. You can save waveform data, screenshots, and settings to a USB flash drive.
- **Signal Curve Memory:** The DSO-2104 can store up to 16 signal curves, which can be displayed on a PC in real-time for further analysis.

Figure 5.1: Example of VOLTCRAFT test equipment, including oscilloscopes, in a laboratory setting, demonstrating typical usage scenarios.

6. Maintenance

Proper maintenance ensures the longevity and optimal performance of your oscilloscope.

- **Cleaning:**
  - Always disconnect the power cord before cleaning.
  - Use a soft, damp cloth with a mild detergent to clean the exterior of the device.
  - Do not use abrasive cleaners or solvents, as they may damage the casing or display.
  - Keep the display screen clean using a soft, lint-free cloth.
- **Storage:**
  - Store the oscilloscope in a dry, dust-free environment away from direct sunlight and extreme temperatures.
  - When not in use, cover the device to protect it from dust accumulation.
- **Ventilation:** Ensure the ventilation grilles on the rear panel are clear of obstructions to allow for proper airflow and prevent overheating.
- **Calibration:** Periodic calibration by qualified personnel is recommended to maintain measurement accuracy.

7. Troubleshooting

This section addresses common issues you might encounter with your DSO-2104 oscilloscope. If the problem persists, contact customer support.

7.1 No Power

- **Check Power Cable:** Ensure the power cable is securely connected to both the oscilloscope and the power outlet.
- **Check Power Outlet:** Verify that the power outlet is functional by plugging in another device.

- **Check Fuse:** If applicable, check the power fuse (refer to the device label for fuse specifications and replacement instructions, if user-replaceable).

7.2 No Waveform Displayed

- **Check Probe Connection:** Ensure probes are correctly connected to the input channels and the circuit under test.
- **Check Channel Enable:** Verify that the desired input channel is enabled on the oscilloscope.
- **Adjust Vertical Scale:** The waveform might be off-screen. Adjust the Volts/Div knob to a suitable range.
- **Adjust Horizontal Scale:** The waveform might be too compressed or expanded. Adjust the Time/Div knob.
- **Check Trigger Settings:** Incorrect trigger settings can prevent a stable waveform display. Try "Auto" trigger mode or adjust the trigger level.
- **Run/Stop Button:** Ensure the oscilloscope is in "Run" mode (not paused).

7.3 Unstable Waveform

- **Adjust Trigger Level:** Fine-tune the trigger level to a stable point on the waveform.
- **Select Correct Trigger Type:** Choose the appropriate trigger type (e.g., Edge, Pulse) for your signal.
- **Check Probe Compensation:** Improperly compensated probes can lead to distorted waveforms. Perform probe compensation if necessary.

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8. Specifications

The following table details the technical specifications of the VOLTCRAFT DSO-2104 Digital Oscilloscope:

Feature	Specification
Brand	VOLTCRAFT
Model Number	VC-11539895
Bandwidth	100 MHz
Channels	4
Max. Sampling Rate	1 GSa/s
Memory Depth	80 kpts
Vertical Resolution	8 bits
Display	7-inch (17.78 cm) LCD, 800 x 480 pixels
Interfaces	USB
Power Supply	100-240 V, 50/60 Hz
Max Power Consumption	10 W
Dimensions (L x W x H)	30.1 x 15.2 x 7 cm

Feature	Specification
Weight	1.1 kg

9. Warranty and Support

9.1 Warranty Information

The VOLTCRAFT DSO-2104 Digital Oscilloscope comes with a **1-year warranty** on spare parts availability. For specific warranty terms and conditions, please refer to the documentation included with your product or contact VOLTCRAFT customer service.

9.2 Customer Support

If you encounter any issues not covered in this manual, or require technical assistance, please contact VOLTCRAFT customer support. Have your model number (DSO-2104) and serial number ready when contacting support.
For more information about VOLTCRAFT products and services, please visit the official VOLTCRAFT website or refer to the contact details provided in your product packaging.