



# Scope2k4 User Manual

## 1 Introduction

This manual describes the Scope2k4 oscilloscope software and hardware. The following paragraphs describe the setup of the hardware and installation steps to be performed to install the software.

## 2 Content of scope2k4 package

The scope2k4 package you purchased should contain following items:

- Analog to digital converter module (Printed Circuit Board)
- Battery clip for a 9 Volt battery (battery not included)
- CDROM containing Scope2k4 installation software and the electronic version of this manual

## 3 Installing the hardware

This paragraph describes the setup of the Scope2k4 hardware.

### 3.1 Connect hardware to printer port

Before connecting anything to the computer's printer port, make sure the computer is completely switched off. Failing to do so, might results in permanent damage to the computer's hardware or the Scope2k4 PCB. The producers of Scope2k4 can't be held responsible for any damage to your computer due to incorrect connection methods.

The printer port on which the Scope2k4 hardware is connected, can not be shared with any other hardware devices at the same moment. If you need your printer port for other peripherals (printers, zip-drives, etc) you need to install a hardware switch.

Connect the Scope2k4 PCB to a printer port which is operating ECP mode. Check your Windows 2000 or XP system devices to see if your printer port is configured correctly. See appendix A for more information.

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### 3.2 Connect the one channel module

Figure below shows the 1 channel module with labels indicating the main components. Make sure to connect the external power to the correct terminal pins with the correct polarity. When the power switch is set the “on” position, the LED should turn on. If not, check the power connection and the input voltage.

Input voltage range : +7.5 Volt to 12.0 Volt. (Note : higher input voltages than 12.0 Volt can damage the module or the computer the module is connected to)

Connect your measurement leads to the two terminal pins which are labeled “Active Signal” and “Ground”.

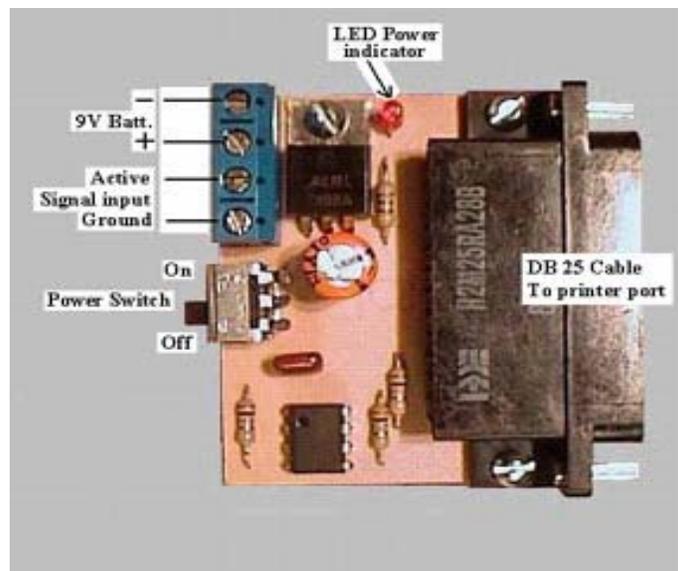


Figure 1, one channel module description



### 3.3 Connect the two channels module

Figure below shows the 2 channel module with labels indicating the main components. Make sure to connect the external power to the correct terminal pins with the correct polarity. When the power switch is set the “on” position, the LED should turn on. If not, check the power connection and the input voltage.

Input voltage range : +7.5 Volt to 12.0 Volt. (Note : higher input voltages than 12.0 Volt can damage the module or the computer the module is connected to)

The two measurement leads should be connected with standard audio jacks to the two inputs labeled “input 1” & “input 2”. Center of each audio type jack is the active signal input. Outer core of each jack is ground.

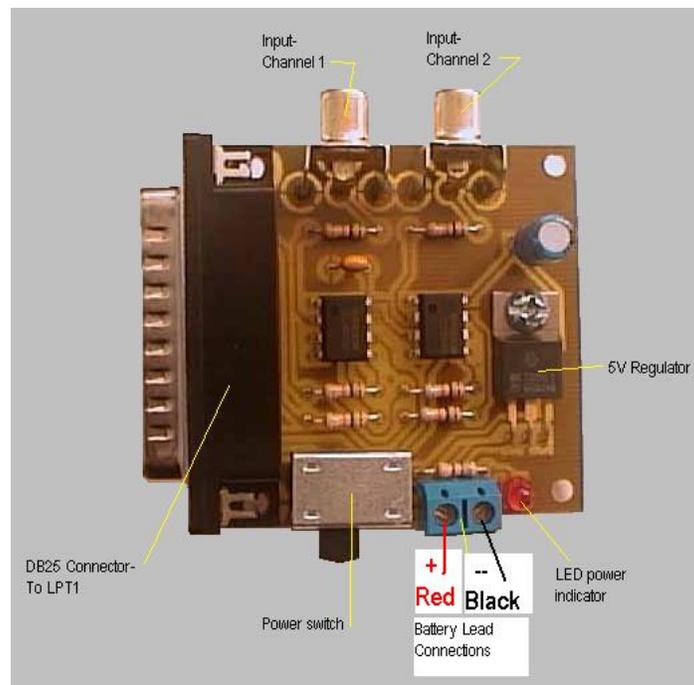


Figure 2, two channel module description



## 4 Software installation and configuration

### 4.1 Installation of the software

Insert the cdrom in to your computer's cdrom drive. If your computer is configured for it, the setup program will start automatically. If not, open your windows explorer, browse to your cdrom-drive and start the **setup.exe** program.

If your software was supplied to you as **setup.zip**, you first have to run Winzip.exe (or similar program) to unzip the file and then run the **setup.exe** afterwards.

When the installation has started, several screens are displayed, offering you the possibility to change for example installation location.

Experienced Windows users can tune the installation according to their wishes, other users most likely will find the default settings appropriate.

When the installation program has finished, desktop icon "Scope2k4" has been created as well as a menu group named "Scope2k4". Under this menu group following menu items are found:

- Scope2k4
- Scope2k4 Manual
- Uninstall

Select the menu item "Scope2k4" to start the main program.

Select the menu item "Scope2k4 manual" to read this manual.

Select the menu item "Scope2k4" to uninstall the software.

### 4.2 Registration of the software

When the Scope2k4 software is executed for the first time after the installation has been finished, it will ask for a registration name and code. Enter your personal codes that you received with your purchase of the hardware. Note: the registration name and code are cAsE sensitive. Enter them identical as they were supplied to you (use copy-paste to make sure you make no mistakes). Failing to register the program will disable key features of the software.

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Figure 3, registration dialog

### 4.3 Setup of the analog to digital converter parameters

Running the software for the first time, it is needed to setup / check the Analog-Digital converter settings. Choose the menu item “Interface”, “Setup AD Converter” and dialog below will displayed. In this dialog, select your LPT port, your type of converter (99% TLC549) and the hardware input range. (this last one is the physical range of the TLC549 converter. This is 5.0 Volt unless you have a made your own input adjustment circuits).

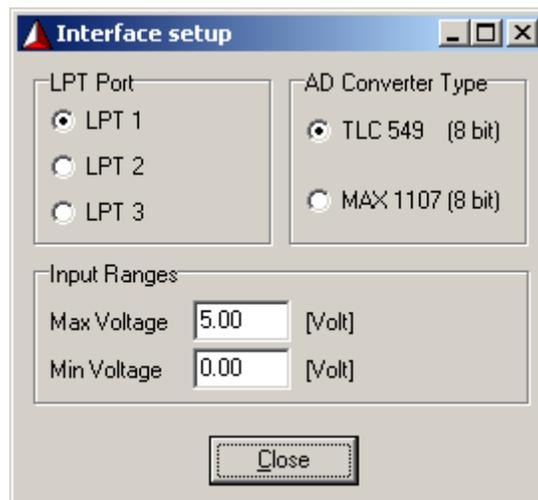


Figure 4, Analog-Digital converter setup dialog



## 5 Operation the Scope2k4 program

Start the Scope2k4 program (use desktop icon or select scope2k4 from the Start menu).

The picture below shows the main program window. This window contains the main menu and the most important Push Buttons. With these buttons new measurement can be started, measured data can be saved and previously saved data can be re-opened. Also some other tools are available, like mouse zoom function, adjustable display ranges and X-Y sample modes.

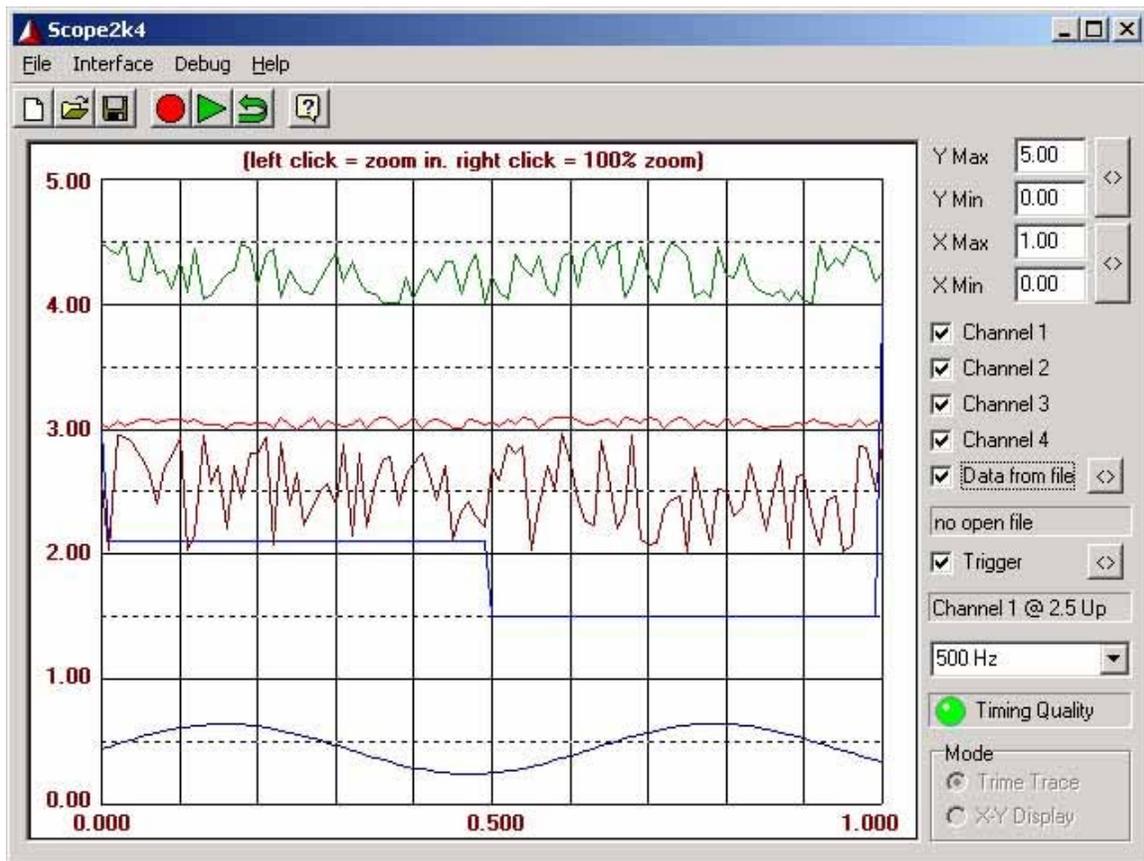


Figure 5, Scope2k4 main program window

The screen above shows 4 different signals displayed on the screen. This is representative of what the 4 channel scope module might display during use. The screen will only display as many channels as are provided in the module you have purchased. That is, the one channel module will display one signal trace, the two channel module will display 2 traces, etc. If you wish to upgrade the module you are currently using to more channels, please contact Bob Kenne at email address [bkenne@earthlink.net](mailto:bkenne@earthlink.net) to inquire about the trade in/upgrade program.



### **Channel Selection**

Use the check box beside each of the 4 channels to activate the channels you wish to display.

### **Graphic Display Adjustment**

X and Y adjustment boxes are also provided. Remember that the X axis is the horizontal axis and the Y axis is the vertical. The main functions of these adjustments are:

- 1) To bring the display above the zero line. If a negative voltage or the input signal has a negative component, you can position the signal higher on the display by changing the Y min value to a negative number slightly greater than that of the input signal. A bit of practice on this will help you get familiar with these functions.
- 2) To increase or decrease the size of the display. Quite often, the input signal is too small or too large for the display. Increase the size of the display by reducing Ymax to a smaller number. Decrease the size of the display by increasing Ymax to a larger number.
- 3) To vary the X axis speed and display. By varying X max you can change the size and amount of waveform displayed. Here again, a bit of practice is recommended.

### **Measurement speed adjustment**

The software determines the measurement frequency. Select from the drop down box your desired frequency. Min value = 20 Hz & max value = 4000 Hz (4 kHz).

### **Timing Quality Indicator**

When a measurement is running, the Green / Yellow / Red LED indicates the quality of the measurement. Remember, the measurement frequency and accuracy are determined by the operating system / Windows. If a lot of processes are running in the background, timing for the Scope2k4 program might not be optimal. This will result in a poor measurement, indicated by the "Timing Quality Indicator".

Green = measurement is accurate

Yellow = the measurement was interrupted

Red = the measurement was significantly disturbed by the operating system. Do not trust the measured data, to be safe, make a new measurement.

### **Data From File**

You can view a previous waveform or data from a file by checking the box next to this function. Select the file you wish to view by clicking the box (<>) next to this function.

### **Trigger Function**

Checking this box will select the trigger function option. When this option is selected, the trace can be triggered by any of the 4 channels. Clicking the <> box beside this function will open a pop up window that allows selection of the channel used to trigger, the part of the signal used for the trigger and the amplitude of the signal required to trigger a

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sweep trace. When this function is selected, the chosen parameters will be displayed in a box just below the trigger box.

### **Display Mode**

The time trace mode displays a signal on the X-Y axis as does a conventional oscilloscope.

The X-Y display mode is used to show a signal on both axes.

### **Mouse operated zoom**

Move with the mouse pointer to the area of the measurement you want to zoom in and LEFT click. This will enlarge the graph at that area. To go back to 100% zoom, right click the mouse anywhere in the graph.

### **Save measurements to file**

To save measured data in a file for storage, select the save option from the menu. Select the location where you want to save the data and in the 2<sup>nd</sup> dialog select the traces to be stored.

## **6 Input adjustment circuits**

In some cases, the standard measurement range of 0.0V to +5.0 Volt might not be sufficient for the measurement to be performed. For example, the needed input voltage range is larger or you want to measure symmetrical signals. In this paragraph two input adjustment circuit are presented. These example circuits can be used to develop specific input adjustment circuit to measure a wide range is electrical signals. Feel free to adjust / adapt / modify the presented designs for your needs.

### **6.1 Increased measurement range circuit (0.0 Volt to +10.0 Volt)**

The standard connection schematic for the TLC549 / MAX1107 will result in a measurement range of 0 Volt to +5 Volt DC. In a number of situations, it is desirable to have a larger input measurement range. The schematic below, displays one of the solution that can be used to measure for example 0 Volt to +10 Volt. By adjusting the input resistor divider (in this case 10 kOhm and 10 kOhm), the voltage range can be modified. For example : when the 10 kOhm resistor in the upper right corner is replaced by a 30 kOhm resistor, the measurement range becomes 0 Volt to +20 Volt.

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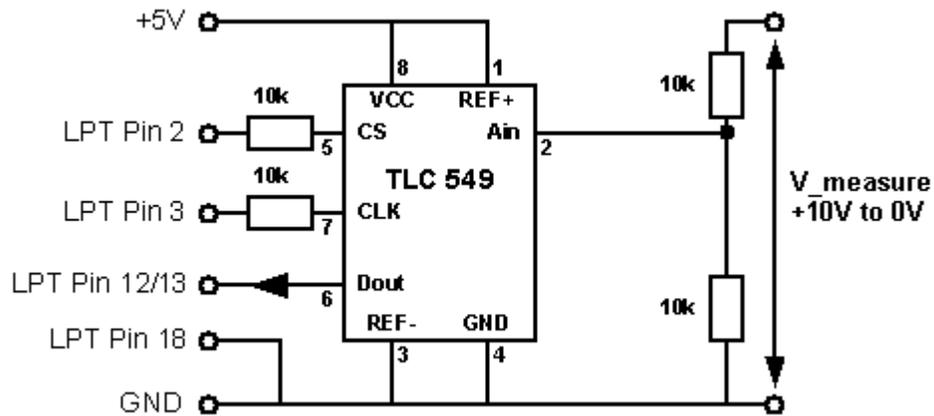


Figure 6, increased input range circuit

## 6.2 Symmetrical measurement range circuit (-5.0 Volt to +5.0 Volt)

The standard connection schematic for the TLC549 / MAX1107 will result in a measurement range of 0 Volt to +5 Volt DC. In a number of situations, it is desirable to have a symmetrical measurement range. The schematic below, displays one of the solution that can be used to measure for example -5 Volt to +5 Volt. By adjusting the input resistor divider (in this case 10 kOhm and 10 kOhm), the voltage range can be modified. For example : when the 10 kOhm resistor in the upper right corner is left out, the measurement range becomes -2.5 Volt to +2.5 Volt. Replacing this resistor with a 30 kOhm resistor will increase the measurement range to -10 Volt to +10 Volt.

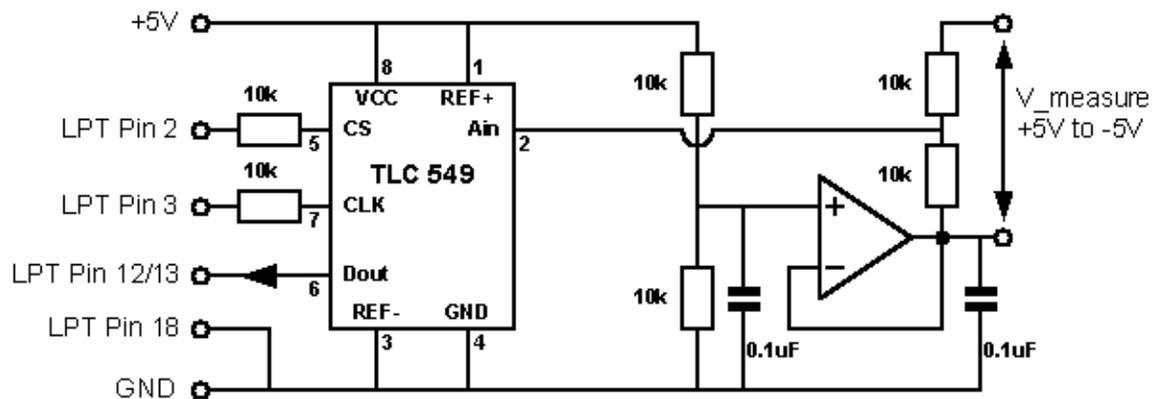


Figure 7, symmetrical input range circuit



### 7 Troubleshooting your scope

Your Scope2K4 hardware has been tested prior to shipment to ensure that is in proper working order. If you have difficulty getting it to function properly, please review the following conditions and solutions to help in finding the correct solution to the problem

**Problem:**

No power, LED power indicator unlit.

**Possible causes:**

- Dead or weak battery.
- Power switch not on.
- Battery wires reversed or not connected.
- Battery not connected

**Problem:**

Signal or trace not registering on scope display.

**Possible causes:**

- Unit not turned on or battery dead or battery not connected.
- DB-25 cable defective or not connected.
- Wrong input port selected or unit connected to wrong port.
- Wrong channel selected on software.
- Wrong A/D converter selected on setup menu.
- Trace sweep not activated on Scope screen control panel.
- No input signal existent or connected.

**Problem:**

Timing quality indicator is **RED** or **YELLOW** most of the time

**Possible causes:**

Windows spends too much time on other processes. Try to minimize other interrupts as much as possible. Disable firewall, virus scan and close as much other programs as possible. Do not burn cdroms which using Scope2k4 and do not run Winamp. All these program consume a significant amount of processor time and therefore can cause degraded measurements.

If you have hardware difficulties you cannot resolve, contact Bob Kenne at [Kenne@earthlink.net](mailto:Kenne@earthlink.net)

If you have software difficulties you cannot resolve, contact Matthijs Hajer at [MatthijsFH@freeler.nl](mailto:MatthijsFH@freeler.nl)

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## Appendix A – ECP printer port configuration

Before installing the Scope2k4 hardware, check your printer port's configuration. The port should be configured as ECP. If not, most likely, you need to change this in your BIOS settings. Refer to your computer's manuals to see how to change the BIOS settings.

