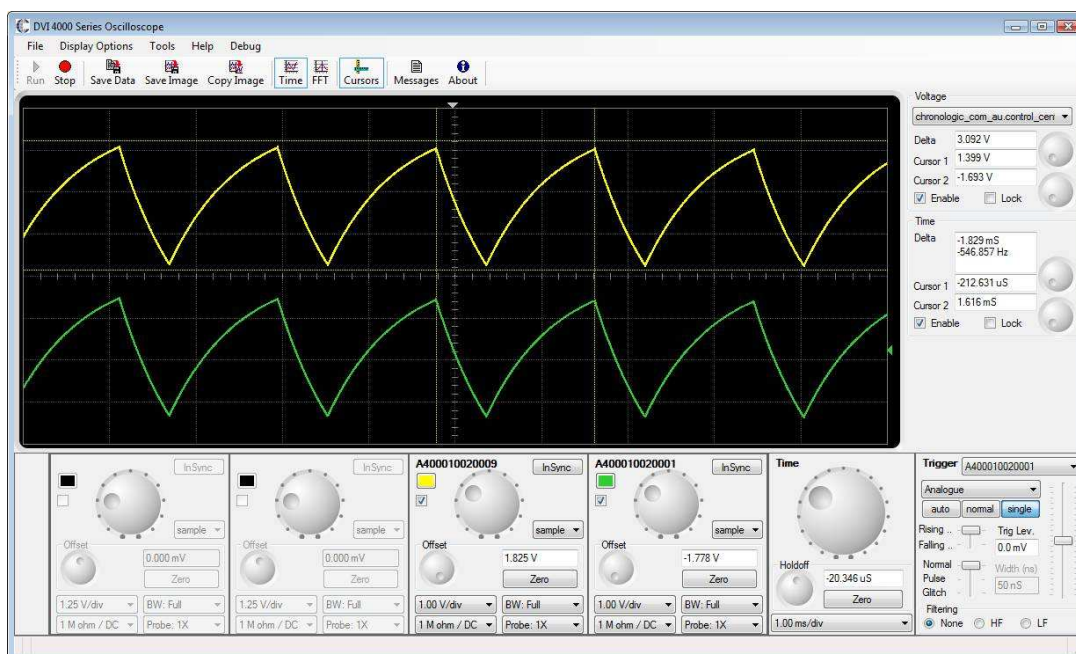




DVI 4000 Series Oscilloscope

Software User Manual



DVI 4000 Series Oscilloscope – Software User Manual

Contents	Page #
• General Information	3
• DVI 4000 Series Oscilloscope Overview	5
• Using Modules with DVI 4000 Series Oscilloscope	11
○ CL4000 – DVI	11

General Information

Note: ChronoLogic was formerly named Fiberbyte – Users may encounter some references to Fiberbyte in the software & hardware

Electrical Safety

ChronoLogic modules should never be opened. There are no user serviceable parts inside the modules. Opening the modules will void any applicable warranties. Refer to the manufacturer for service issues.

Warranty

All ChronoLogic products are warranted against material defects for a period of twelve (12) months from the date of shipment. During the warranty period, ChronoLogic will, at its discretion, either repair or replace products or components, which prove to be defective.

For warranty service or repair, this product must be returned to a service facility designated by ChronoLogic. International customers shall pay all shipping charges, duties and taxes in both directions for products returned to their nearest authorised ChronoLogic representative.

ChronoLogic further warrants that all software and firmware designated by ChronoLogic for use with the ChronoLogic equipment will execute its programming instructions when properly installed on that equipment. ChronoLogic does not however warrant that the equipment will function uninterrupted or error free.

Limitations of Warranty

To the extent limited by law and subject to any term, condition or warranty implied by the Australian Trade Practices Act (1974) which cannot be excluded or modified by agreement, ChronoLogic makes no warranty apart from those expressly set out above.

The above said warranties shall not apply to defects resulting from improper or inadequate handling, use or maintenance of this equipment, customer supplied software, interfacing, unauthorised modification or misuse, operation outside of the environmental specifications for the product or improper site preparation or maintenance. The above said warranties are void if the user opens the device.

Certification and Standards

ChronoLogic devices comply with all required regulatory standards. ChronoLogic is certified to ISO 9001:2008 and maintains commitment to design and manufacture to the highest quality standards. ChronoLogic also provides voluntary compliance with RoHS.

Hazardous Locations

The ChronoLogic modules are not designed for use in hazardous locations.

Life Critical Applications

The ChronoLogic modules are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. ChronoLogic customers using or selling these products for use in such applications do so at their own risk and by doing so agree to fully indemnify ChronoLogic for any damages resulting from such improper use.

Subject Matter

The material in this document is subject to change without notice. ChronoLogic makes no warranty of any kind with regard to this printed material, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. ChronoLogic shall not be liable for errors contained herein or for incidental or consequential damages in connection with the provision, performance, or use of this material.

Where to find more information

The following documents can be found in electronic format and provide additional information relevant to the operation of your ChronoLogic module:

Documents on your local computer

When you install the USB-inSync software package, the following electronic documents are copied to the chosen installation directory on your local drive. The default installation directory is "C:\Program Files\ChronoLogic_com_au.usbinsync.w.x.y.z", where "w", "x", "y" and "z" are the installation version numbers. Documents are located in the <install directory>\docs.

Documents on ChronoLogic's web site

The most recent version of the ChronoLogic Product User Manual can be found in electronic form on the ChronoLogic web site www.chronologic.com.au in the "Resources/FAQ" section.

Copyright

This document contains proprietary information that is protected by copyright. All rights are reserved. No part of this document may be reproduced in (including electronic storage and retrieval or translation into a foreign language) without prior agreement and written consent from ChronoLogic as governed by Australian and international copyright laws.

© Copyright 2010
ChronoLogic Pty Ltd
227 Gouger St,
Adelaide SA 5000
AUSTRALIA

Trademarks (™)

ChronoLogic, USB-inSync, USB-RealTime, Legato, Maestro and Control Center are either registered trademarks or trademarks of ChronoLogic Pty Ltd in Australia and/or other countries.

Microsoft, Windows, Access, Excel, Visual Basic and VisualStudio are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

LabVIEW is a registered trademark of National Instruments Inc.

IDL is a registered trademark of Research Systems Inc.

Matlab is a trademark of The Mathworks Inc.

Patents

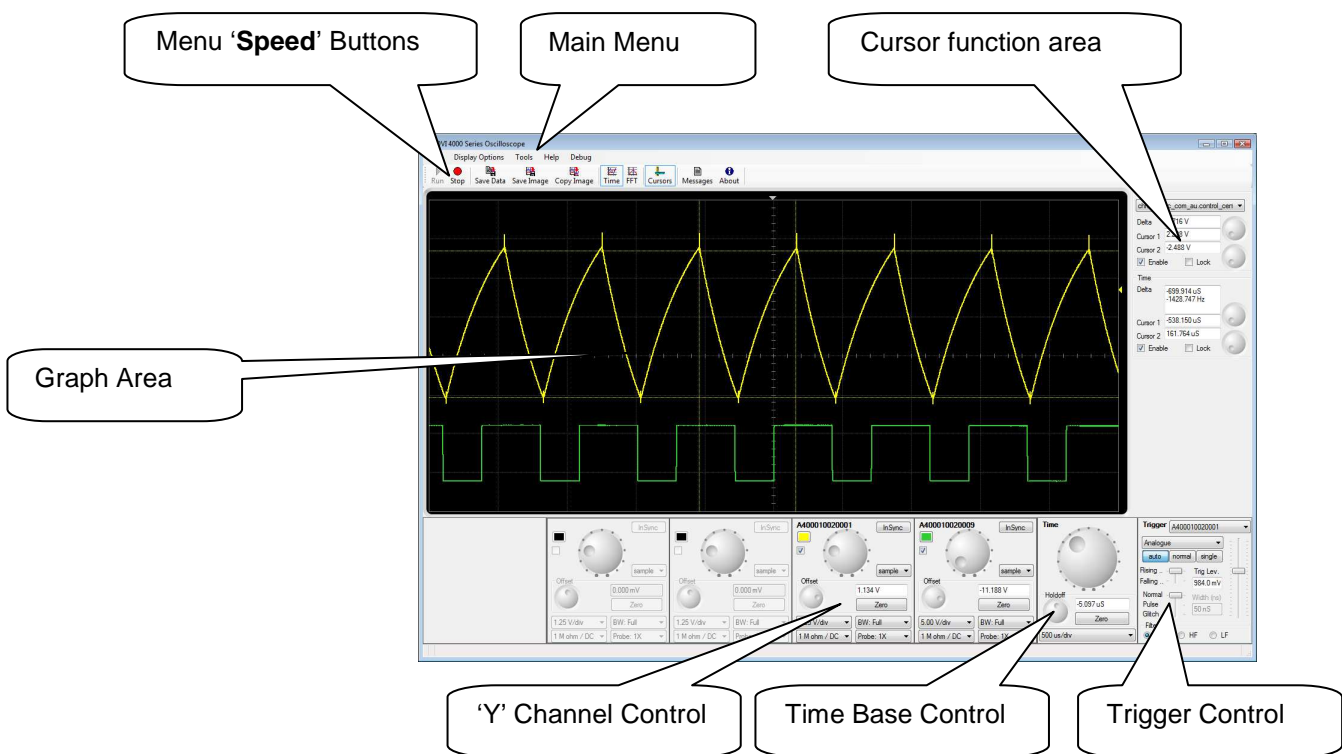
ChronoLogic is a technology innovation company that develops and commercialises proprietary technology. ChronoLogic utilises the international patent process and other relevant conventions to protect its intellectual property (including its core USB-inSync™ technology) and preserve its competitive advantage worldwide.

For full details of ChronoLogic's patents, please visit www.chronologic.com.au/patents

DVI 4000 Series Oscilloscope Overview

The DVI 4000 Series Oscilloscope is a versatile and detailed software program that is supplied free with ChronoLogic's hardware modules. The program provides all of the standard features and options that users expect from an Oscilloscope interface, in addition to the added versatility provided by ChronoLogic's USB-inSync technology and a computer-based scope solution.

The DVI 4000 Series Oscilloscope demonstrates the versatility of USB-inSync by enabling the creation of a synchronized multi-channel oscilloscope using individual CL4000 modules connected to the user's computer via USB. Modules may be removed and added at any time while the program is running, and will automatically synchronize to other modules, creating an oscilloscope with any number of channels.



Speed buttons

Run

Will start acquiring data from all connected modules, and display the traces on the screen

Stop

Will stop acquiring data

Save Data

Will save the data used to draw the current traces into a .csv Excel file. A 'Save File' dialog will allow the user to save the file into a specified location.

Save Image

Will save a bitmap copy of the current screen to a .bmp file. A 'Save File' dialog will allow the user to save the file into a specified location.

Copy Image

Will copy the current screen into the Windows clipboard, where it may be pasted directly into a document or other program

Time

Will switch the display to a normal voltage-time graph. This is the default mode of the program.

FFT

Will switch the display to a frequency spectrum graph.

Cursors

Will show a cursor dialog panel and cursor lines on the screen, allowing the user to examine time and voltage levels on the traces.

Messages

Will open a 'Messages' window showing any warning or error messages. If there are any messages to show, this button will start flashing red.

About

Will display an 'About' box, giving the program's version number.

Main Menu

File

Exit

Closes the program

Display Options

Colour

Sets the background colour of the graph. Options are: Black, White, ChronoLogic (sets the colour to the blue in the ChronoLogic logo), and User. User will allow the use to select his own colour via a Colour Dialog Window.

Persist

This simulates the action of the old phosphor electron beam oscilloscopes by displaying previous traces in a faded colour behind the latest trace. This is very useful for capturing multiple waveforms and seeing how the waveforms vary from trace to trace. The persist mode may be set to 'Fade', where the older traces will gradually fade away, or to 'Infinite', where all previous traces will be shown until they are cleared by changing the persist mode.

Line Mode

This controls how the trace on the screen is displayed. The default mode is 'Vector', where straight lines are drawn between individual acquisition points read from the module. Other modes are 'Dot', where no lines are drawn, only the individual acquisition points are drawn as dots, and 'Curve', where a curved line is drawn so as to pass through all acquisition points.

Tools

ReSync

Modules are synchronized automatically when they are plugged into the USB system. In the event that they loose synchronization, all modules may be re-synchronised using this option.

Help

User Manual

Will open a copy of the Adobe Acrobat™ in a new window. Note that this requires Adobe Acrobat™ to be installed on the computer.

Patents

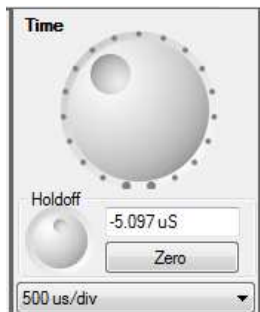
Will open a window which provides a link to the 'Patents' page on the ChronoLogic website.

About

Displays an 'About' box giving the program's version number.

Time Base Control

The oscilloscope can operate in 'Time' mode (displaying a normal time/voltage trace), or frequency spectrum mode (displaying an FFT transform of the signal) by selecting the appropriate button, see 'Speed Buttons' section.



In 'Time' mode, the Time Base control is displayed in the bottom panel, second from the right. This sets the horizontal resolution of the display. This can be set using the large dial in the top center of the control, or the drop down list at the bottom of the control. Changing the Time Base by either method will adjust the setting of the alternate control.

The selected time scale may be read from the lower drop down list, and applies to the horizontal divisions on the graph panel. In the above example of 500 μ s/div, each of the ten horizontal divisions would give show 500 micro seconds of the trace, and the whole screen would show a total of 10*500 or 5 milliseconds of the trace.

When the trace is being triggered (see the section on the Trigger Control), the trigger point is shown in the center of the screen by default, and is indicated by a downward pointing triangle at the top of the graph screen.

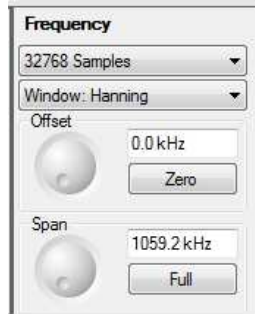
The display position of the trigger point may be varied to the left or right by using the 'Holdoff' controls. Enter the desired holdoff time into the textbox as a positive or negative number using the correct units ('ns' for nano seconds, 'us' for micro seconds, 'ms' for milliseconds or 's' for seconds), and press the 'Enter' key.

The 'holdoff' of the trigger point may also be varied by moving the Holdoff dial control with the mouse, or by using the downward pointing trigger holdoff triangle on the graph screen by clicking on it with the mouse, and dragging it to the left or right.

The holdoff may be reset to zero by clicking on the 'Zero' button.

FFT Control

The oscilloscope can operate in 'Time' mode (i.e. when displaying a normal time/voltage trace), or frequency spectrum mode (displaying an FFT transform of the signal) by selecting the appropriate button, see 'Speed Buttons' section.



In 'FFT' mode, the Frequency control is displayed in the bottom panel, second from the right, replacing the Time control described previously.

This control sets the parameters of the FFT transform, and portion of the frequency spectrum that is displayed on the screen.

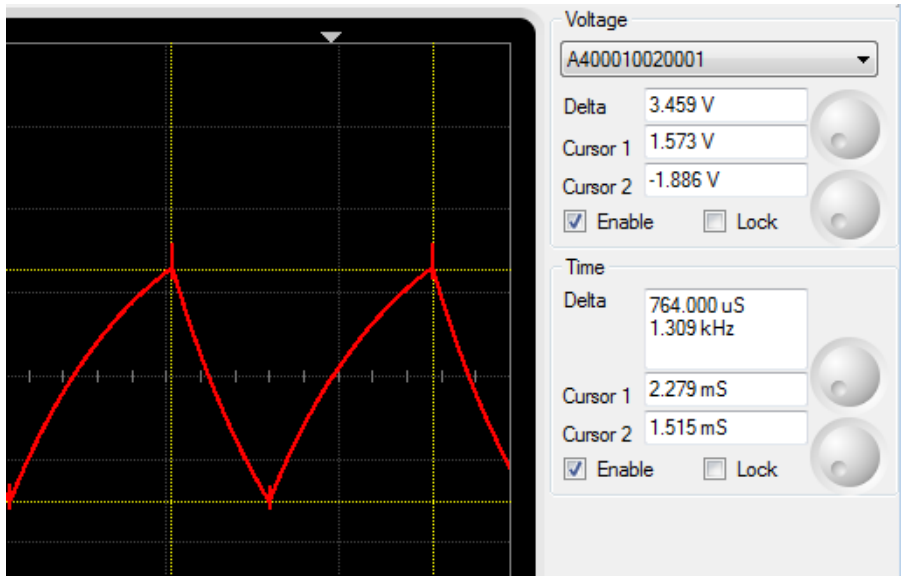
The drop down list at the top sets the number of samples used for the transform. More samples mean a finer resolution, but also mean more (and hence slower) computation. The optimum selection will be tradeoff involving the desired update rate, number of channels being displayed, computer power and speed, etc.

Window compensation may be applied to reduce the effects of the signal cutoff on each end of the sample window; this is selected using the 'Window' drop down list. At present only a Hanning window supported.

The 'Offset' and 'Span' controls are used to set what portion of the frequency spectrum is displayed on the screen. The 'Offset' sets the frequency displayed on the left hand side of the screen, and the 'Span' controls the frequency range across the whole screen. Values may be entered using the text boxes, or by the appropriate dial gauges.

Clicking the 'Zero' button will set the offset to 0 Hz, i.e. the left hand side of the graph will represent DC. Clicking the 'Full' button will cause the graph to display the maximum possible frequency range. For the DVI 4000 modules this will be $\frac{1}{2}$ of their maximum sampling rate.

Cursors



Clicking the 'Cursors' speed button (see section 'Speed buttons') will open the cursors panel on the right hand side of the graph screen, as shown above.

There are two cursors, one for voltage (horizontal lines), and one for time (vertical lines). Each cursor consists of 2 lines which may be placed on the screen wherever the user desires, and show the actual value at the line position, as well as the difference (Delta) between them.

The voltage cursor (top of the cursor panel) can be assigned to any channel using the drop down list at the top below the 'Voltage' text. The level of the 2 cursor lines in the graph (the 2 horizontal dotted lines at the upper and lower peaks of the waveform in the picture above) may be set by entering a voltage value directly into the text boxes, moving the associated dial with the mouse, or by dragging the line directly on the graph display. This is done by positioning the cursor on the line, pressing and holding the left mouse button, and moving the mouse to the desired position.

The 'Delta' text box shows the difference, in volts, between the 2 cursor lines.

The 'Enable' check box will show or hide the cursor lines.

The 'Lock' check box will lock the two lines together so that they can both be moved together by changing the value of the Cursor 1 line. The controls for changing the Cursor 2 line will be disabled.

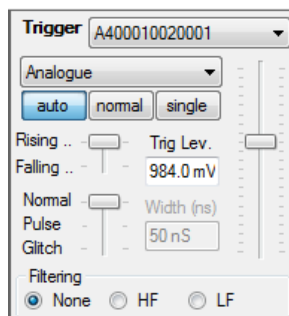
The 'Time' cursor operated in a similar manner, but its lines are vertical, and the units are in time. The 'Delta' text box also shows the appropriate frequency for the displayed time difference.

Using Modules with DVI 4000 Series Oscilloscope

CL4000 – DVI

Trigger Control

Oscilloscope triggering may be controlled by selected by the 'Trigger' dropdown list at the top of the trigger control. Triggering is controlled by the module selected in the 'Trigger' drop-down menu (when multiple CL4000 modules are connected, the selected module acts as a master for all other modules):



Source

The trigger source may be selected as:

Analogue

Driven by a changing voltage level on analogue channel 1 input of the module

External

Driven by a change on the digital input of the module

None

No triggers will be generated

Mode

The trigger mode may be set using the three buttons below the trigger source drop down list, possible selections are:

Auto

The system will wait for a trigger condition to occur, but if none happens within a certain time, will force an update of the screen with the latest trace.

Normal

The system will wait for a trigger condition to occur indefinitely. When a trigger happens the screen will display the triggered trace with the trigger point shown correctly as set by all the relevant controls. The system will then automatically re-arm and wait for another trigger.

Single

Similar to 'Normal' mode, but the system will not re-arm automatically. To re-arm the system manually, click on the 'Single' button again.

Level

Triggers may be generated from either a rising or falling edge, as set by this control. For an 'Analogue' trigger source, the actual level may be entered in the 'Trig Lev.' Text box directly or by moving the vertical slider bar on the right hand side of the control. The trigger level is shown on the graph panel by a left facing triangle on the right hand side of the screen. This will move up and down as the trigger level is changed. Note that the trigger level can also be changed by dragging the triangle directly using the mouse.

Type

Trigger type may be set to:

Normal

Default mode, where the trigger is generated only by a change level.

Pulse

A trigger is generated when the input signal exceeds the trigger level for the time greater than that specified in the 'Width' text box.

Glitch

A trigger is generated when the input signal exceeds the trigger level for the time less than that specified in the 'Width' text box.

Filtering

A filter may be applied to the signal before it is examined for trigger conditions, this will not affect the actual signal displayed, and can be used to improve triggering with poor signals. Options are:

None

No filtering is applied to the trigger signal.

HF

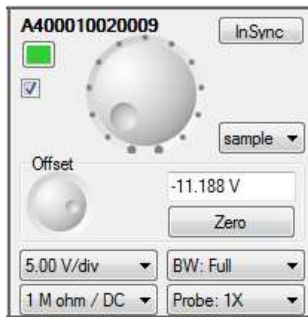
A high frequency filter is applied

LF

A low frequency signal is applied

'Y' Channel Control

The 'Y' channel control for a CL4000 module is shown below:



Serial Number

This is displayed in the top left hand corner of the control.

InSync

This button has multiple functions:

- When it is clicked, the LED on the selected module will flash to identify it.
- When the 'Focus' button on the module is pressed, it will flash red, and display the text 'Focus'.
- If the module has an error this button will flash red, and display an error message (e.g. 'Power' when the 12 volt power is not connected).

Color

Clicking this square button will display a colour dialog, allowing the user to set the colour of the trace on the screen.

Enabled

Will remove the trace for this module from the graph display, and disable all controls on this channel, except the 'Enabled' control

Voltage Range

The voltage range, in volts per division, is set using the large dial in the center of the control, or the 'V/div' drop down list. Changing either control will update the other.

Display Mode

For any acquisition mode other than full, the data can be displayed in a number of ways:

Sample

A single point is plotted for each acquisition, the value being the voltage at the end of the sample period

Peak

For each sample period, the maximum and minimum voltages are plotted.

Avg

The average voltage for the sample period is plotted

Offset

The trace can be offset vertically on the screen, either to center it or to move it away from other traces. The offset can be entered directly in the edit box using a positive or negative number with the correct units, or set using the Offset dial and the mouse. The offset can be set back to zero by clicking the 'Zero' button.

Coupling

The input coupling can be set using this drop down list to one of four settings:

1 M ohm / DC

One mega ohm, DC connection

1 M ohm / AC

One mega ohm, AC (capacitive) connection

50 ohm / DC

50 ohm, DC connection

- △ **WARNING**; if this is selected care must be taken not to apply a voltage of more than 5 volts to the input or the module will be damaged. The user interface will not allow a dangerous combination, but has no control over the actual voltage connected to the device.

Ground

The input is grounded

Bandwidth

A 20 MHz low pass filter can be applied to the input to prevent any aliasing effects.

Probe

If a probe with a voltage divider is connected, it can be compensated for by selecting the appropriate range here.

© ChronoLogic Pty Ltd 2010

