

QuickScope Reference Guide

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© 2010 Control Technology Corp.

25 South Street
Hopkinton, MA 01748

Phone: 508.435.9595
Fax: 508.435.2373

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Table of Contents

1	Chapter 1: Overview	4
2	Chapter 2: QuickScope and QuickView Features.....	5
	Invoking QuickScope	5
	Toolbar Summary	7
	Status Bar Summary	7
	Connecting to a controller	8
	Setting up traces	9
	Capturing Data	11
	Evaluating Data	12
	Zoom	13
	A and B Cursors.....	14
	Creating a PDF file	15
	Creating an Excel Spreadsheet	16
	QuickView	16
	Multiple Windows	18
	Index	19

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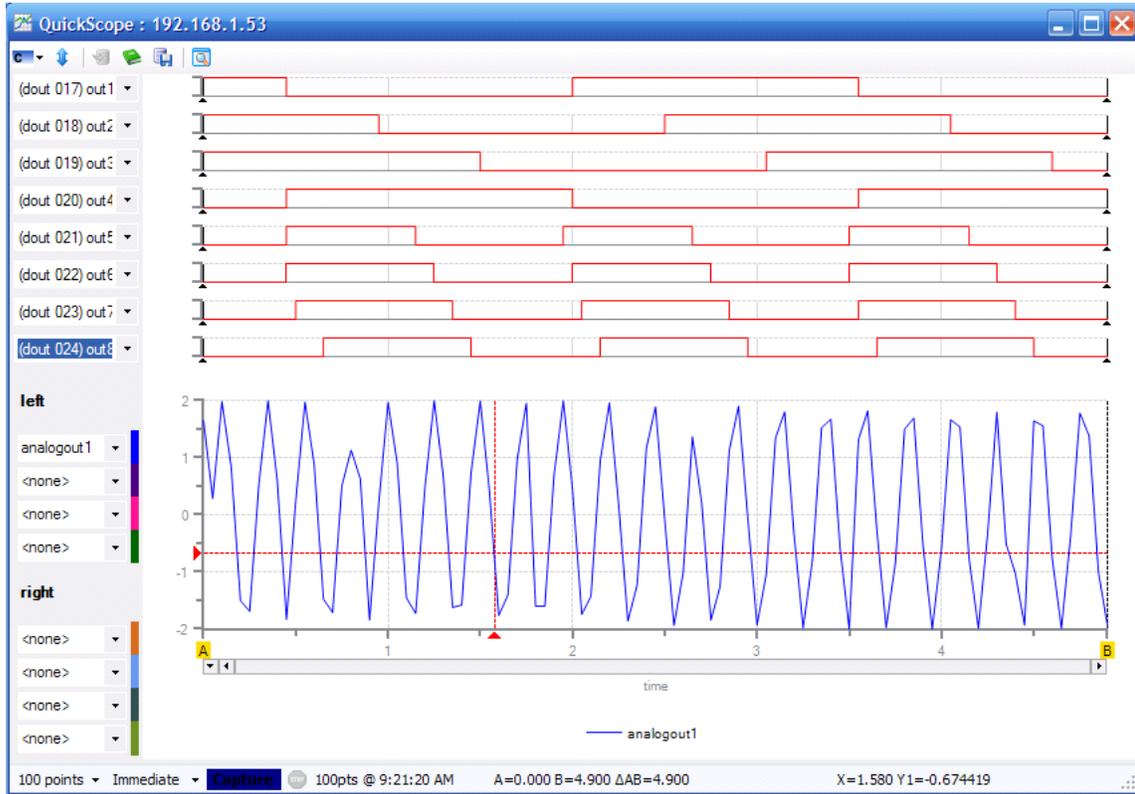
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The information in this document is current as of the following Hardware and Firmware revision levels. Some features may not be supported in earlier revisions.

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1 Chapter 1: Overview

This document will introduce you to the powerful QuickScope tool available for CTC's 5300 series controller. QuickScope is a graphical "digital scope" and extremely useful debug tool.



2 Chapter 2: QuickScope and QuickView Features

There are two components to QuickScope.

- QuickScope (QS) captures data and displays it in a graphic format.
- QuickView (QV) displays and allows editing of data in a tabular format. This is similar to but better than CTCMon since it doesn't deal with registers, but with named resources.

QS & QV interrogate a running program to find out the named resources within the controller.

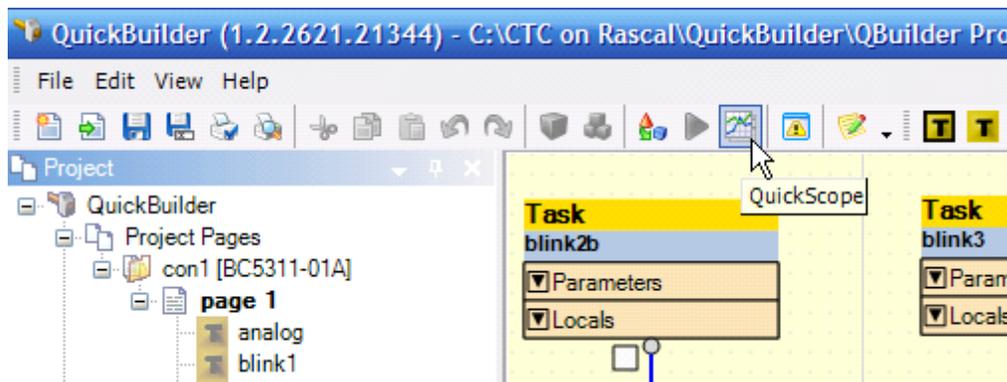
QS & QV will always interrogate the controller for these symbols when connecting to the controller. This means that these named resources are “always” right – there can be no “out of sync” issues as in the old QS2 way of using symbols.

QS & QV can be started as stand-alone applications to monitor the operation of the controller or from within QuickBuilder.

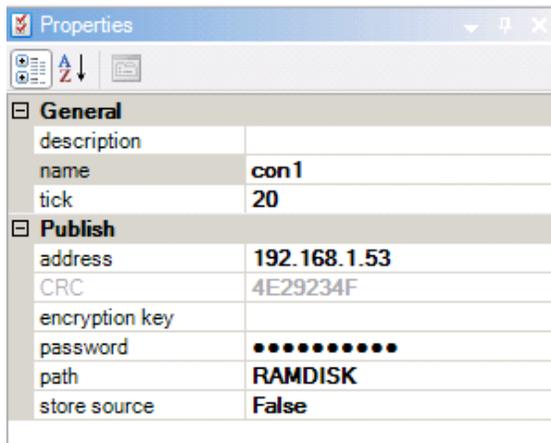
QS Captures can be initiated manually from QuickScope or triggered from within a QuickBuilder (QS4) program using a `$TRIGGER = 1;` command. Refer to the *QuickBuilder QuickStart Guide* for additional information.

2.1 Invoking QuickScope

QuickScope is invoked by clicking on the QuickScope icon shown below.



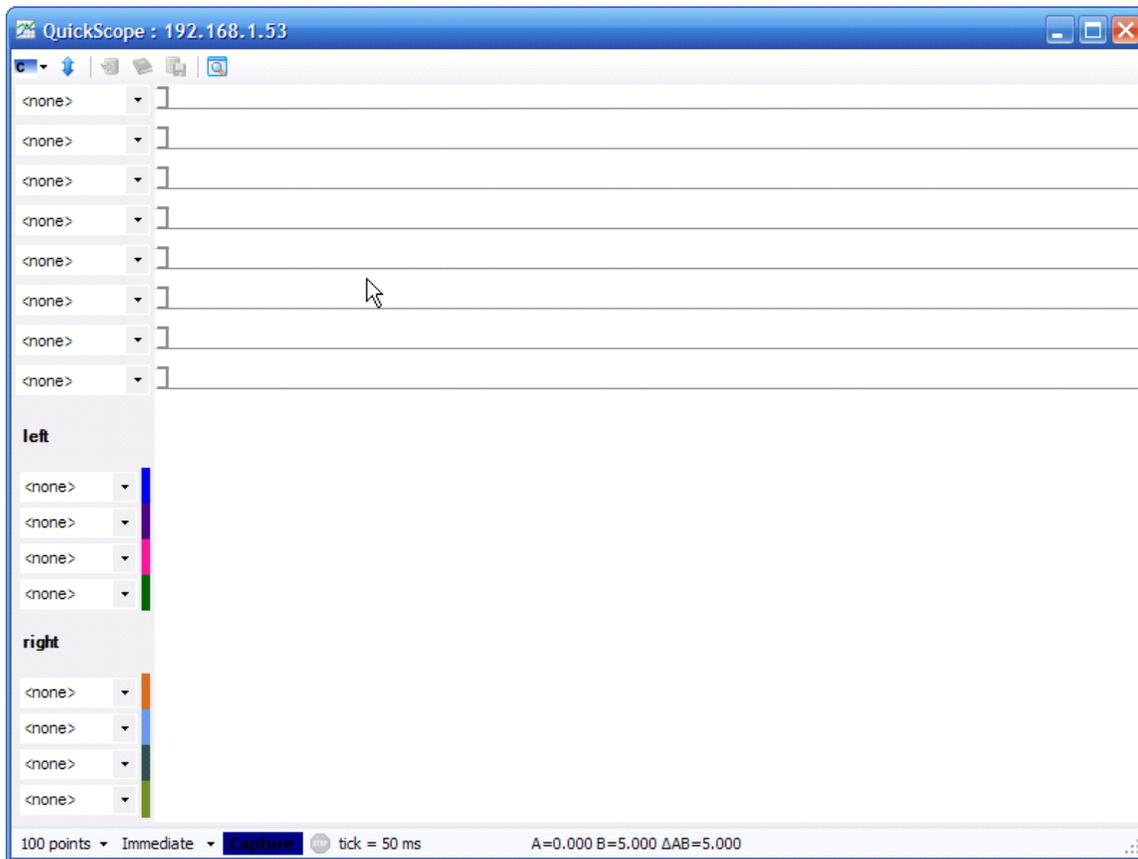
The rate between data captures is determined in QuickBuilder by the **tick** property for the controller. Any adjustment to this rate must be translated, published, and run before the new rate will be implemented in future captures.



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Note: Capturing too much data at a very fast rate may impact the performance of the application project.

The following screen appears once you invoke QuickScope:



2.2 Toolbar Summary

There is a toolbar at the top of the QS window:



1. The first drop-down button selects the controller to connect to. Controllers are auto-discovered just like they are in WebMon 2.0. There is a menu item to add a controller for controllers that cannot be auto-discovered (for example, remote controllers not on the same subnet).
2. The second button re-synchronizes the symbol table. At the present moment, the symbol table is only read once when QS connects to the controller. If you change the program, you will be alerted to re-synchronize the symbol table.

 Note: Some time in the future, this manual re-sync will no longer be necessary as QS (and QV) will “know” that the symbol table has been modified and inform the user that it will now resync on its own.
3. The third button imports saved trace data for re-display.
4. The fourth button will produce a PDF report of the trace data in graphical form.
5. The fifth button writes the captured data as an XLS (Excel) file – not a CSV file. This allows the user to further analyze the captured data. All named logical resources (as well as the “main” user-specified resources) are written to the file – not the selected logical-traces.
6. The last button brings up a QuickView window for the selected controller.

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The *Status* bar allows you to:

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2. Choose *how* and *when* to capture. **Immediate Capture** means to capture when the capture button is clicked. **Triggered** means to capture when a signal is generated by the QS4 program using this statement :

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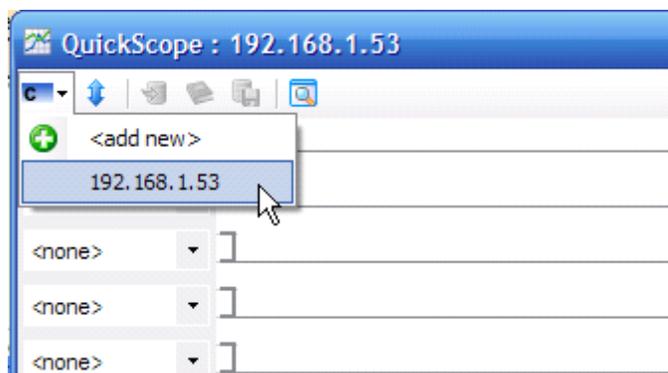
If already in a capture, re-triggers are ignored.

3. Stop the capture (when in capture mode). By clicking the **Stop** button, the capture is aborted and no capture data (even partial) is returned.
4. Next to the **Stop** button in the lower *Status* bar, there is a readout that indicates the current status. Initially when a connection is made to the controller, the tick period is displayed. This is the capture period *per point* for the data capture. When capturing, there are several messages displayed here:
 - **Waiting** — This means that another capture is in progress (perhaps by another QS program) and that it is waiting until that one completes.
 - **Initing** — This means that trace set-up data is being sent down to the controller in preparation for a capture.
 - **Capturing...** — This means that the controller is recording data. A percent complete is displayed, as it can take a while for some tick values and “# of points” to process.
 - **Wait4Trig** — This means that **Triggered** mode was selected, and the controller is waiting for a QS4-based signal (see item 2 in this list).
 - **Loading** — This means that the capture is complete and QS is retrieving the captured data points.
5. In the middle of the *Status* bar you will find readouts for the A and B cursor as well as the difference between them. The A and B cursors can be moved by dragging them from their initial full-right and full-left positions. They can be moved in either the upper or lower plot areas – they are vertically synched between the two plots. This is a fast and accurate way to measure between two items.
6. At the far right in the *Status* bar there are **X**, **Y1**, and **Y2** values displayed. These are used with the red crosshairs in the lower *Main* trace window. These allow you to measure the value (both X & Y) for each of the two axes of captured data.

2.4 Connecting to a controller

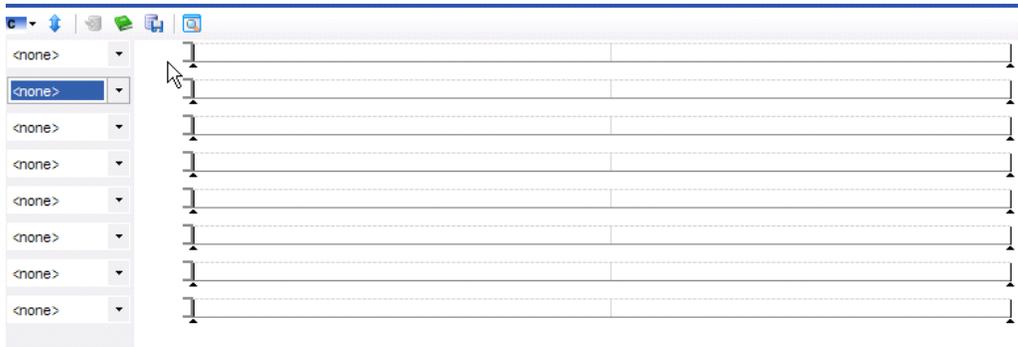
QuickScope should interrogate your network and find the available controllers. You can click on the **Connect to Controller** icon and select the controller you want to connect to.

If you do not see the controller you want to connect to, simply select **<add new>** and type in the address of the controller manually.



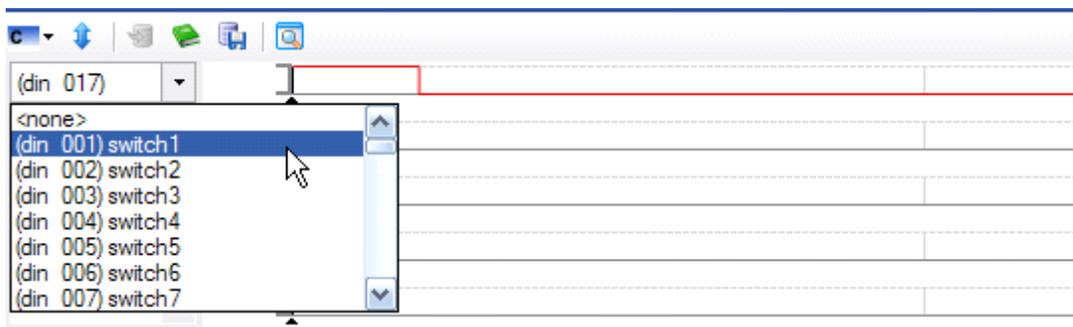
2.5 Setting up traces

The QS window consists of top and bottom trace areas. The top (shown below) consists of 8 “logical” trace charts that allow you to select any of the first 64 inputs or outputs.

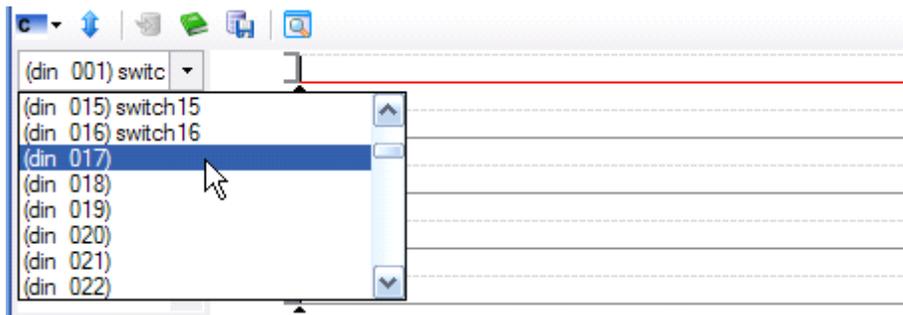


You can select any of the first 64 I/O to be displayed in these 8 trace windows *even after* a capture since the first 64 digital inputs **as well as the first 64** digital outputs are *always* captured.

When an IO point is named (from the running QS4 program), its name will appear in the dropdown trace selector combo box to the left of the trace as shown below.

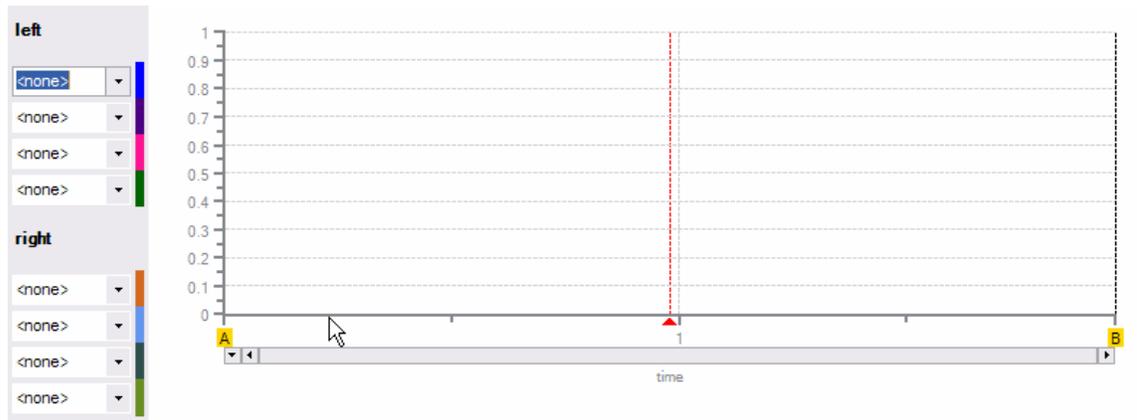


You can also select unnamed I/O in the logical trace window by selecting its input or output channel from the dropdown menu.



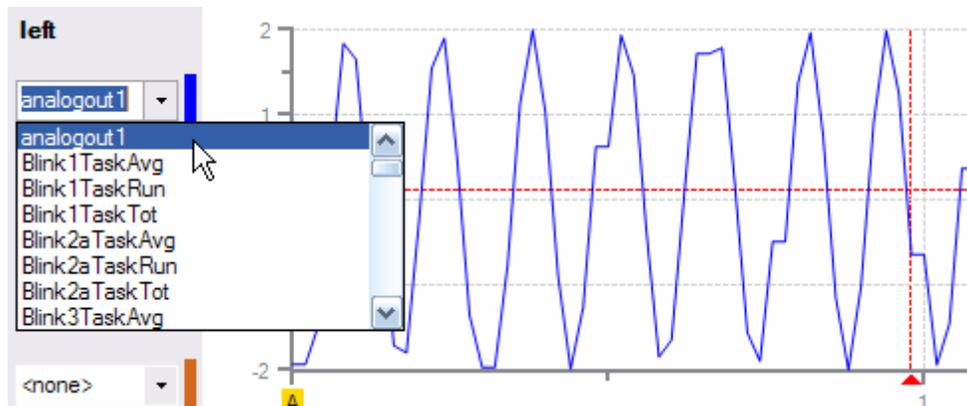
Note: If you need to capture an IO point *beyond* the first 64 ins/outs, the lower *Main* trace combo box selectors need to be used *prior* to capturing the data.

The lower *Main* trace (shown below) allows you to capture 8 additional resources of your choice.



Note: Traces in the lower *Main* trace must be set up *prior* to a capture by using the 8 combo boxes to the left of the main trace window.

You will be able to choose from all variables and *named* analog and digital I/O in this lower *Main* trace area.

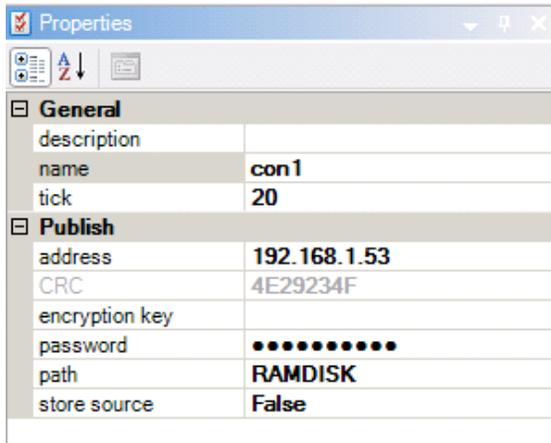


The lower Main trace window allows these 8 items to be grouped in two scalings: left and right.

- If you need to capture some analog inputs (e.g., -10 to +10V), you may want to put those on the left axis so they all have the same scale factor. Then you can use the right axis for something else, perhaps something that is not close in value to +/-10.
- The left and right axes in the *Main* trace scale independently and automatically.

2.6 Capturing Data

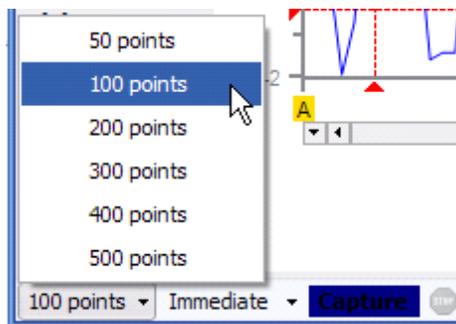
The Controller's **tick** property allows you to set the capture rate within QuickBuilder.



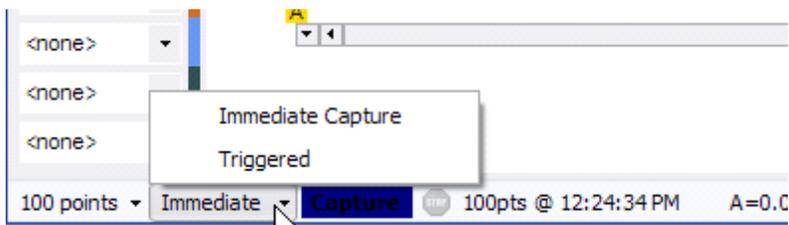
Properties	
General	
description	
name	con1
tick	20
Publish	
address	192.168.1.53
CRC	4E29234F
encryption key	
password	●●●●●●●●
path	RAMDISK
store source	False

Note: Data points will be captured each tick for the 128 digital I/O as well as up to 8 variables for the lower Main trace window. Capturing this amount of data does consume processor resource and users should be careful not to set the tick rate too low, as this could impact the step execution time of the QuickBuilder program. In general, these effects are minimal for tick rates greater than 20 ms.

QuickScope's *Status* Bar allows you to set the number of points to collect during a capture.



As mentioned in the *Status* bar [Summary](#) section, there are two ways to capture data:



Selecting **Immediate Capture** means data will be captured when the **Capture** button is clicked.

Selecting **Triggered** means data will be captured by the QS4 program when the following statement is

generated: `$TRIGGER = 1;`

Once you select trigger mode, you must click on **Capture** in QuickScope. You will then see the following in the *Status* screen:

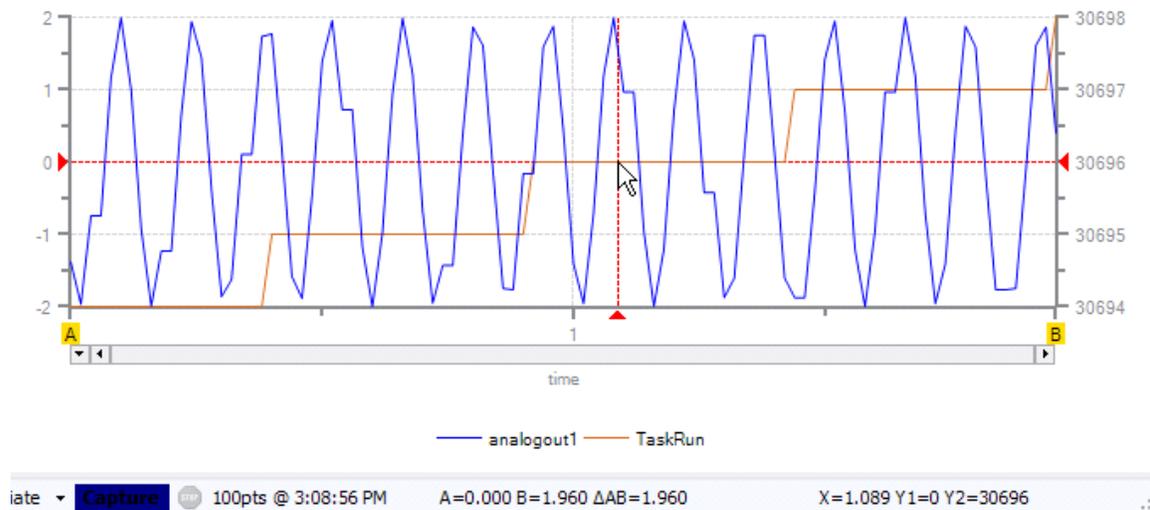


Once your Quickbuilder code initiates the trigger (`$TRIGGER = 1;`), you will see the following and QuickScope will display the captured data when it is completed:



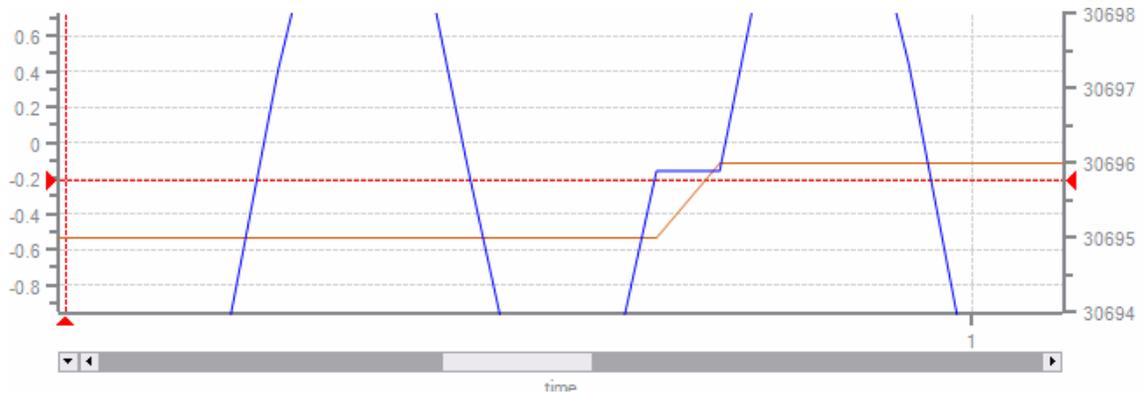
2.7 Evaluating Data

X, Y1, and Y2 values are displayed at the far right in the *Status* bar. These are used with the red crosshairs in the lower *Main* trace window. These allow you to measure the value (both X & Y) for each of the two axes of captured data. Y1 will represent your left trace Y values, and Y2 will represent your right trace Y values. When X represents time, the units will be in seconds.



2.7.1 Zoom

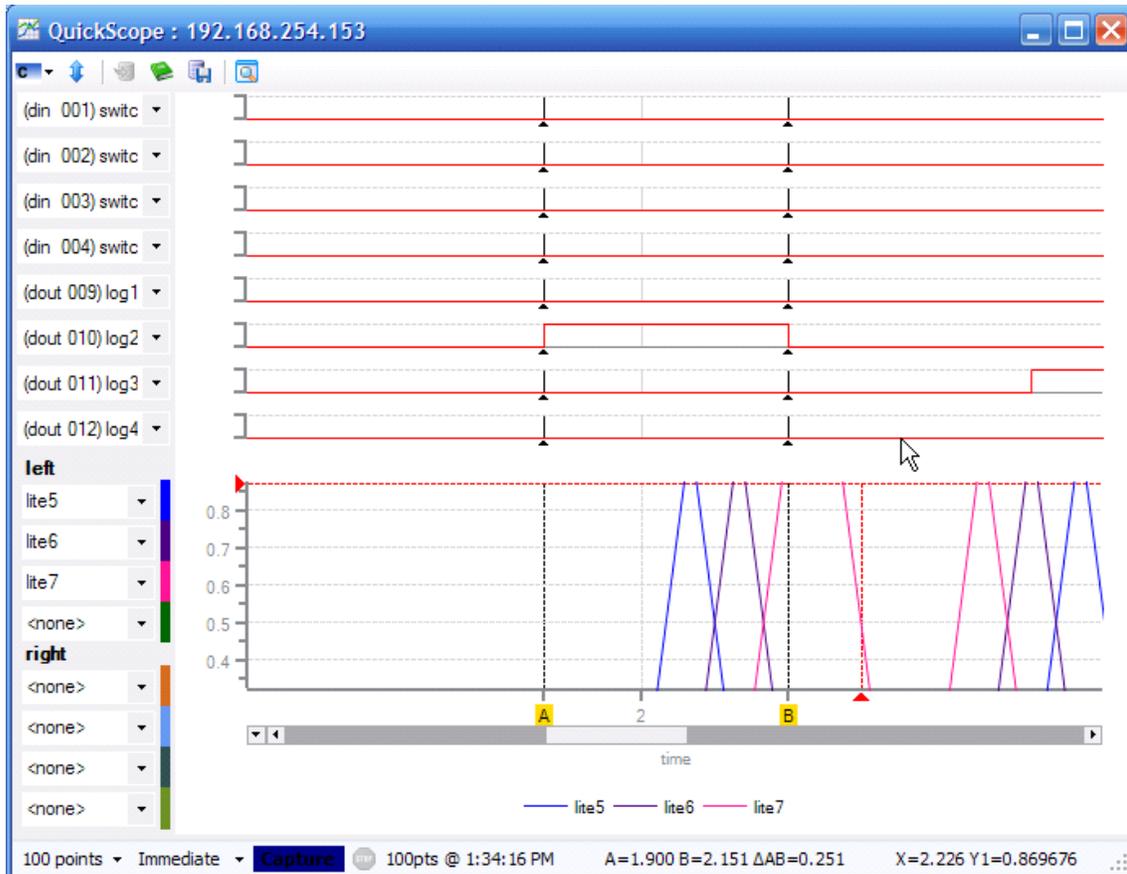
You can also zoom in to get a more precise X, Y reading to an area by clicking and dragging the two desired corners of the window you would like to zoom into.



You can zoom back out by double clicking anywhere outside the lower *Main* trace area.

2.7.2 A and B Cursors

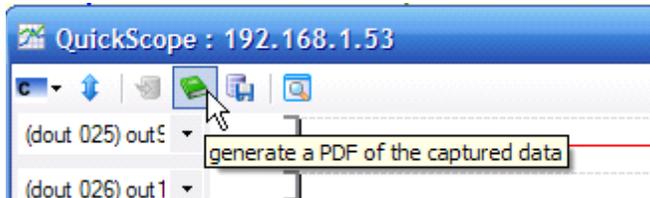
The **A** and **B** cursors are great for obtaining more precise information. In the example below, the trace has been zoomed in on and the **A** and **B** cursors have been dragged and dropped to measure the time that **log2** was on. The bottom of the *Status* bar shows the deltaAB result as being 0.251 seconds.



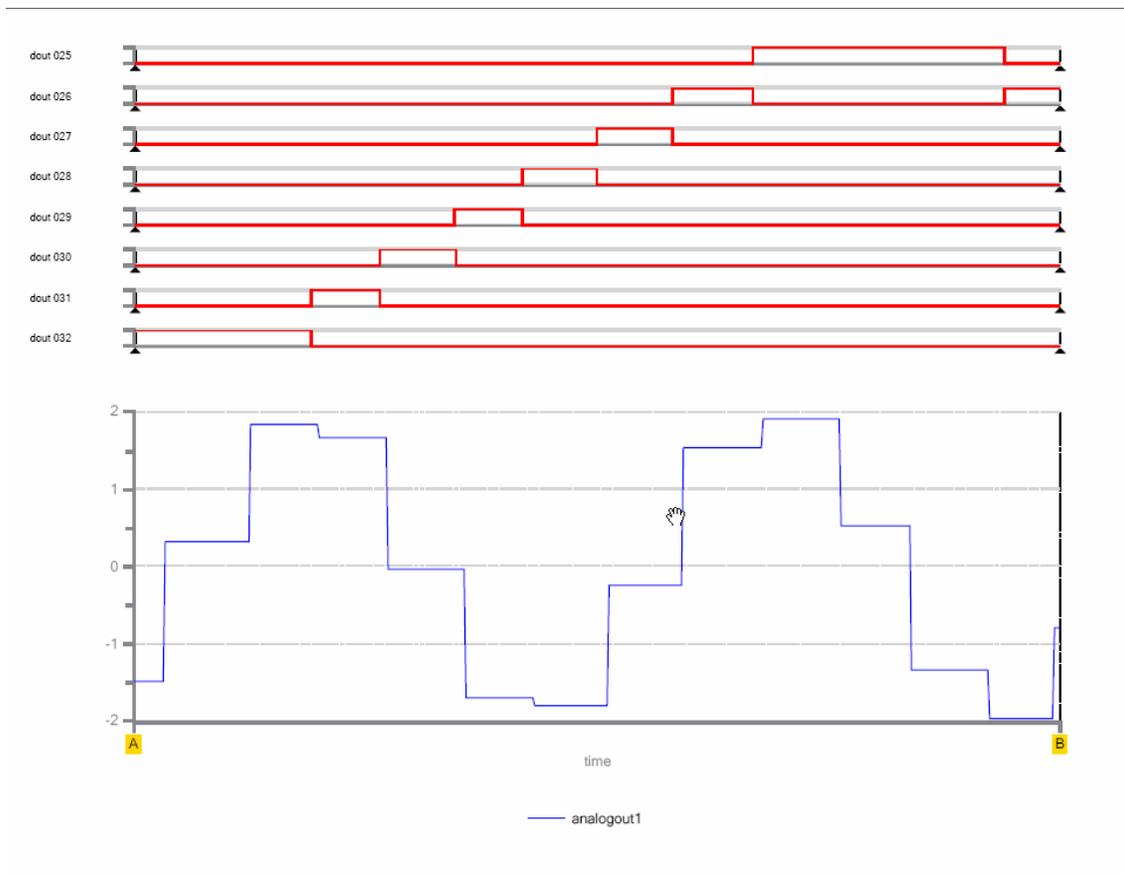
Note: When you zoom in on a chart, the yellow A and B cursor handles may not be visible. To re-align them with edges of the current view, simply click on the A and B read out area in the *Status* bar.

2.8 Creating a PDF file

You can create a PDF file using the **generate a PDF of the captured data** icon shown below:

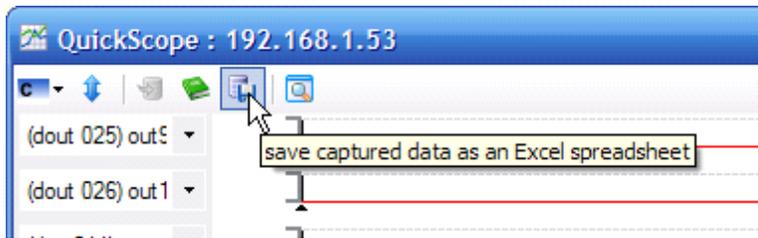


This will create a PDF showing traces of all named digital I/O in the upper trace area(s) and the selected traces in the lower trace area. If you have more than 8 named digital I/O among the first 64 inputs and outputs, your PDF will have multiple pages.



2.9 Creating an Excel Spreadsheet

You can create an Excel spreadsheet file using the **save captured data as an Excel spreadsheet** icon shown below:

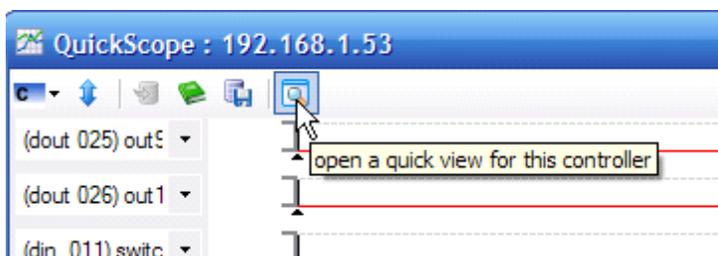


The format of the Excel spreadsheet created appears as follows (time is in units of seconds):

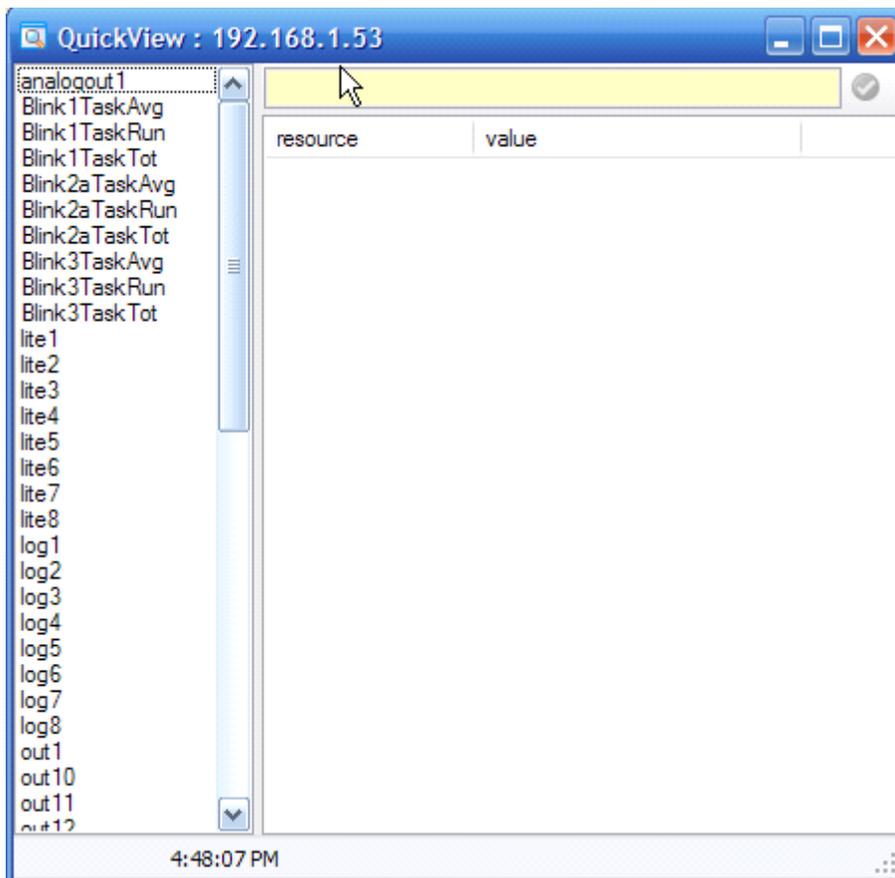
	A	B	C	D	E	F	G	
1	time	analogout1	TaskRun	<none>	switch1	switch2	switch3	sw
2	0	-1.3794	30694	0	1	0	0	
3	0.020003	-1.9639	30694	0	1	0	0	
4	0.040012	-0.74281	30694	0	1	0	0	
5	0.059998	-0.74281	30694	0	1	0	0	
6	0.080001	1.161222	30694	0	1	0	0	
7	0.1	1.99763	30694	0	1	0	0	
8	0.120006	0.997426	30694	0	1	0	0	
9	0.140004	-0.91981	30694	0	1	0	0	
10	0.16	-1.99137	30694	0	1	0	0	
11	0.180003	-1.23208	30694	0	1	0	0	
12	0.199995	-1.23208	30694	0	1	0	0	

2.10 QuickView

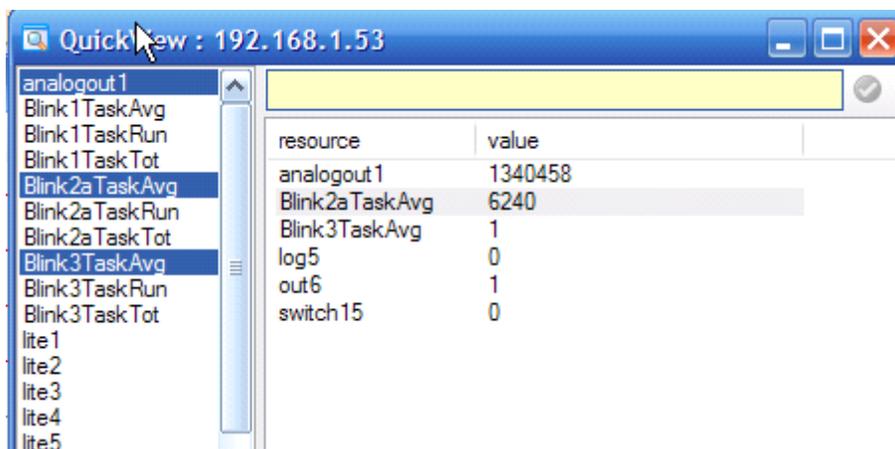
To open QuickView, click on the **open a quick view for this controller** icon from QuickScope:



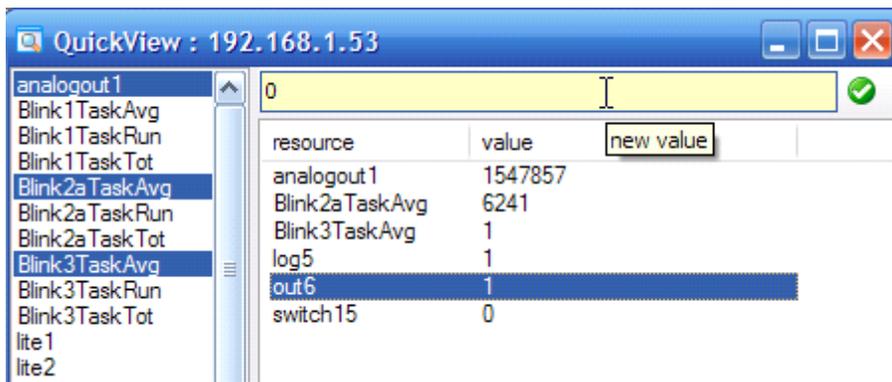
Notice the left side of the screen displays a list of all named resources.



Click on the resources you would like to monitor and they will be added to the right side of the screen along with their values as shown below.

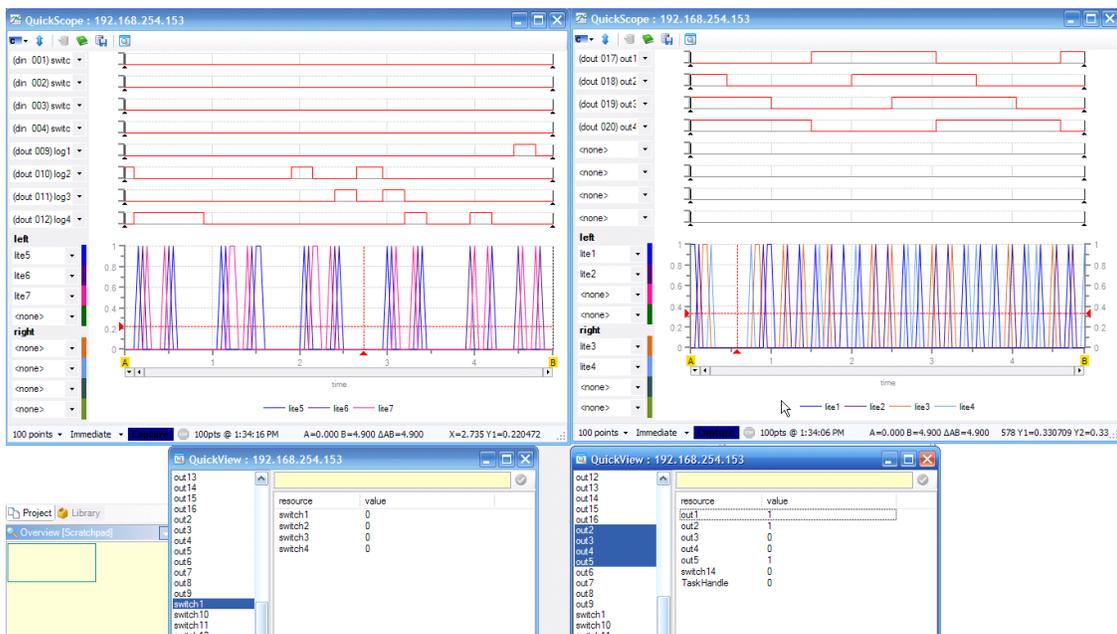


To write a value to the controller, click on the resource you want to change and then enter the new value as shown below. Then click on the green check icon.



2.11 Multiple Windows

You can open multiple instances of QS and QV as shown below. This will allow you to track more resources and monitor more than one controller at a time.



Index

- D -

document:

- general info (QuickScope Reference) 3
- version number (QuickScope Reference) 3

- Q -

QuickScope traces:

- set-up 9
- windows 9

QuickScope:

- A and B cursors 14
 - controller, connecting to 8
 - data collection rate 5, 11
 - features 5
 - immediate capture 7
 - invoking 5
 - multiple windows 18
 - overview 4
 - pdf creation 15
 - performance 5
 - reading data 12
 - status bar 7
 - tick rate 5, 11
 - toolbar 7
 - triggered capture 7
 - xls (Excel) creation 16
 - zoom feature 13
- QuickView: 5, 16
- multiple windows 18

Table of Contents

1	Chapter 1: Overview	4
2	Chapter 2: QuickScope and QuickView Features.....	5
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	Index	19

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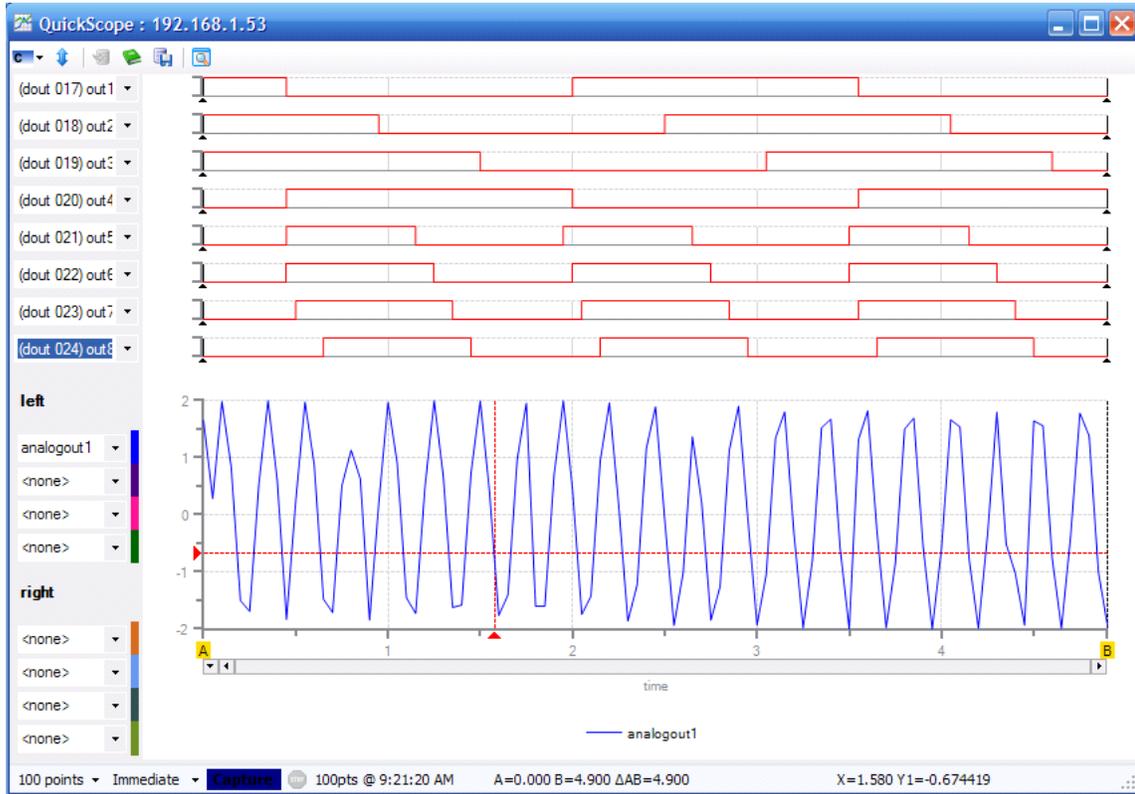
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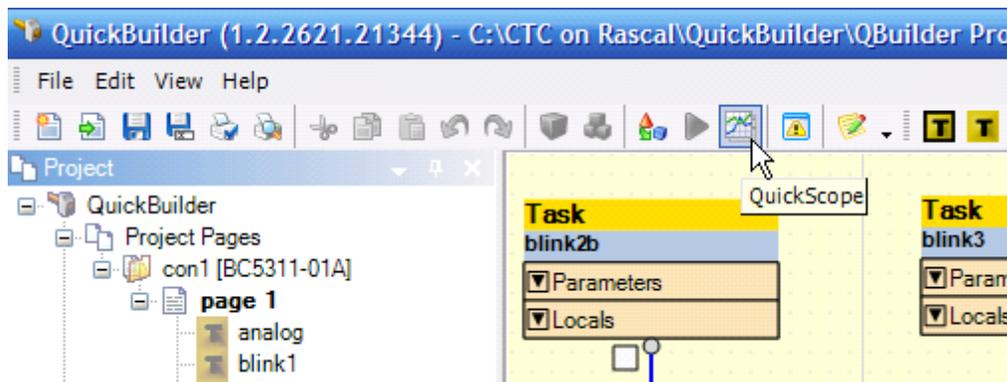
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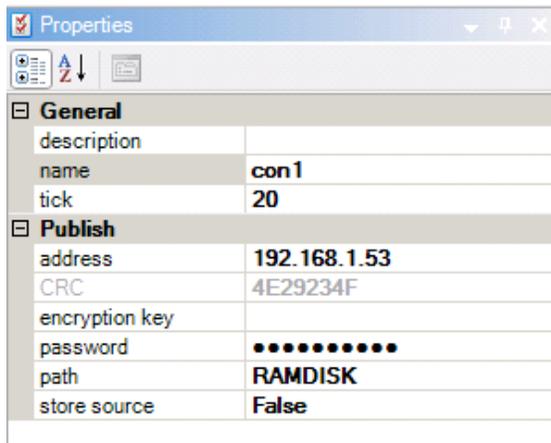
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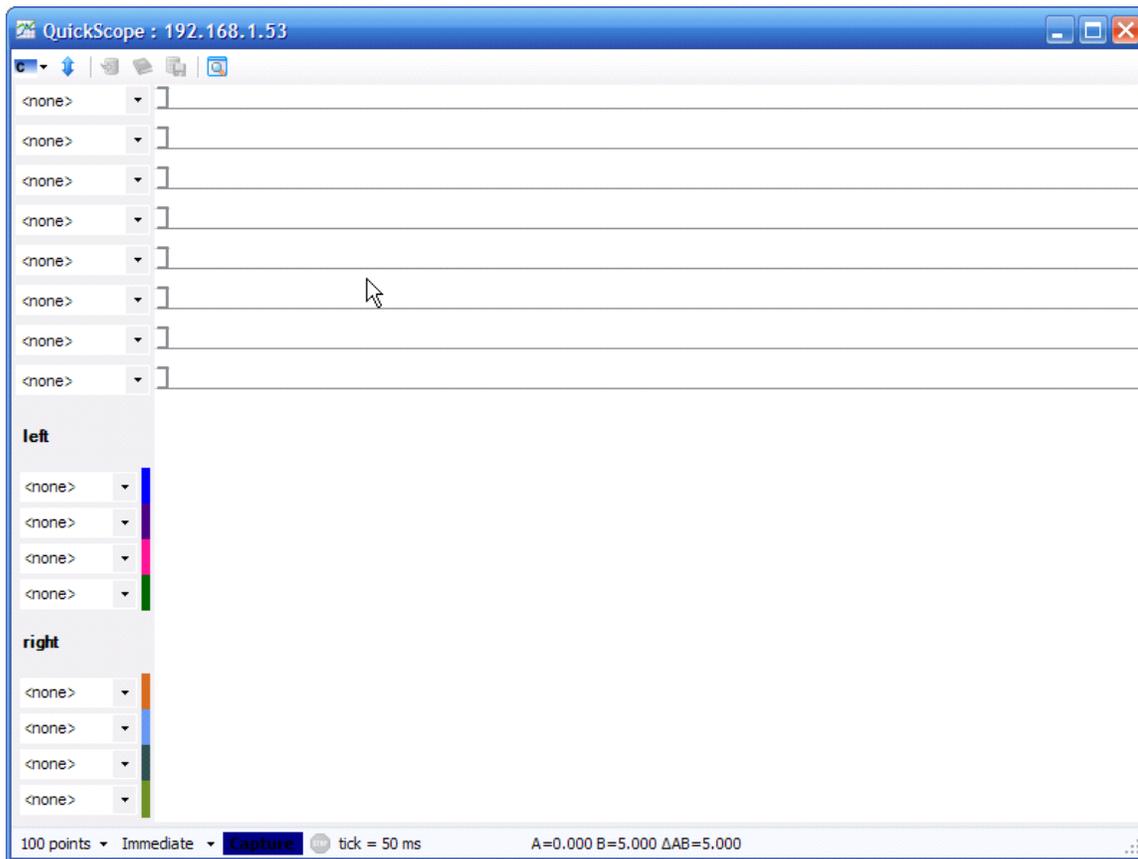
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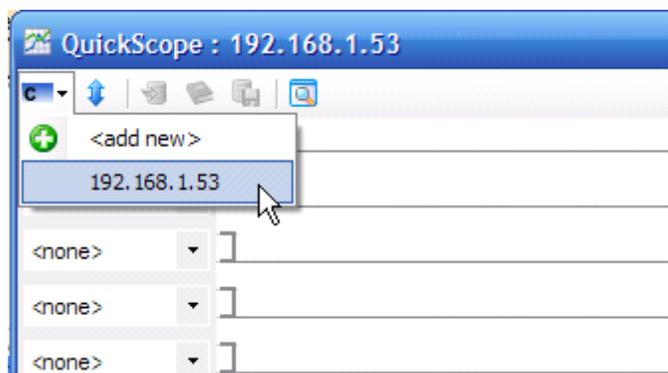
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4. Next to the **Stop** button in the lower *Status* bar, there is a readout that indicates the current status. Initially when a connection is made to the controller, the tick period is displayed. This is the capture period *per point* for the data capture. When capturing, there are several messages displayed here:
 - **Waiting** — This means that another capture is in progress (perhaps by another QS program) and that it is waiting until that one completes.
 - **Initing** — This means that trace set-up data is being sent down to the controller in preparation for a capture.
 - **Capturing...** — This means that the controller is recording data. A percent complete is displayed, as it can take a while for some tick values and “# of points” to process.
 - **Wait4Trig** — This means that **Triggered** mode was selected, and the controller is waiting for a QS4-based signal (see item 2 in this list).
 - **Loading** — This means that the capture is complete and QS is retrieving the captured data points.
5. In the middle of the *Status* bar you will find readouts for the A and B cursor as well as the difference between them. The A and B cursors can be moved by dragging them from their initial full-right and full-left positions. They can be moved in either the upper or lower plot areas – they are vertically synched between the two plots. This is a fast and accurate way to measure between two items.
6. At the far right in the *Status* bar there are **X**, **Y1**, and **Y2** values displayed. These are used with the red crosshairs in the lower *Main* trace window. These allow you to measure the value (both X & Y) for each of the two axes of captured data.

2.4 Connecting to a controller

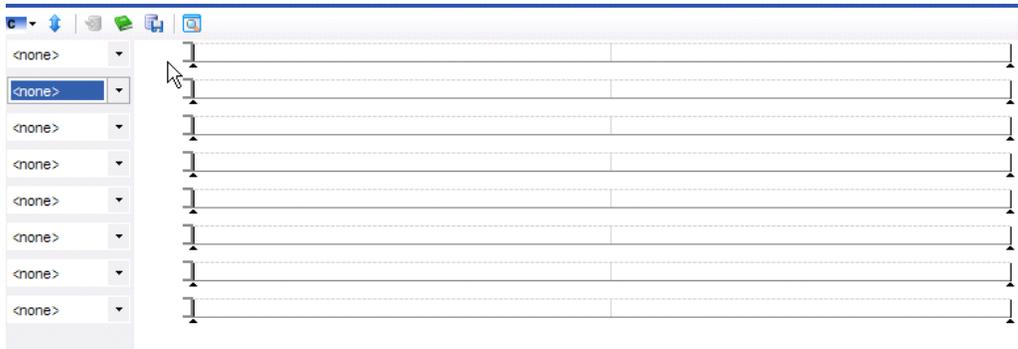
QuickScope should interrogate your network and find the available controllers. You can click on the **Connect to Controller** icon and select the controller you want to connect to.

If you do not see the controller you want to connect to, simply select **<add new>** and type in the address of the controller manually.



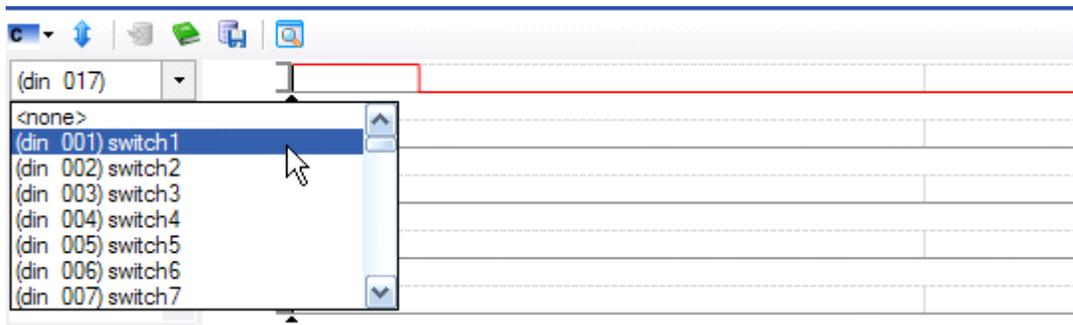
2.5 Setting up traces

The QS window consists of top and bottom trace areas. The top (shown below) consists of 8 “logical” trace charts that allow you to select any of the first 64 inputs or outputs.

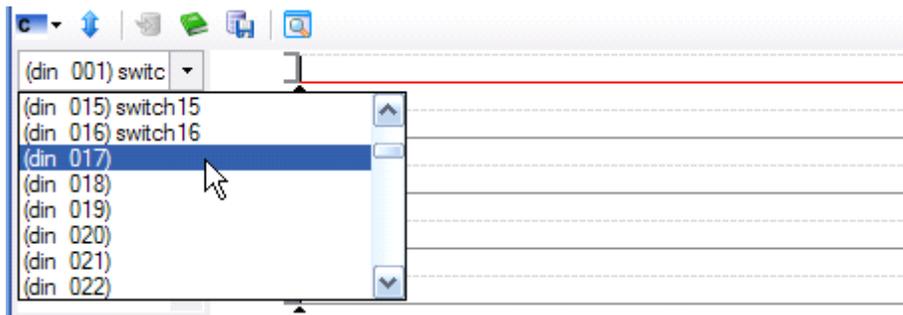


You can select any of the first 64 I/O to be displayed in these 8 trace windows *even after* a capture since the first 64 digital inputs **as well as the first 64** digital outputs are *always* captured.

When an IO point is named (from the running QS4 program), its name will appear in the dropdown trace selector combo box to the left of the trace as shown below.

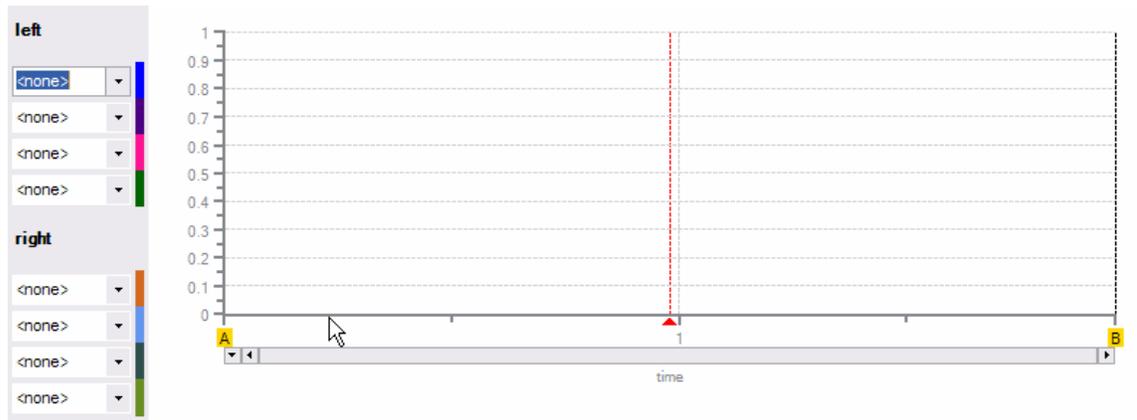


You can also select unnamed I/O in the logical trace window by selecting its input or output channel from the dropdown menu.



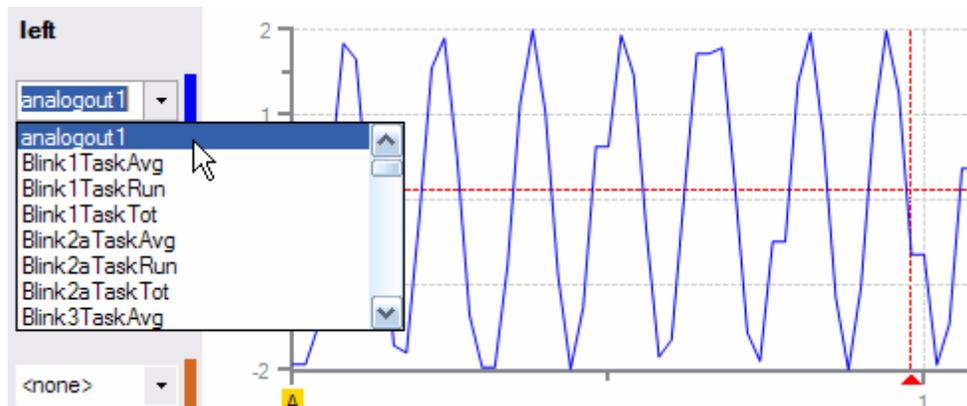
Note: If you need to capture an IO point *beyond* the first 64 ins/outs, the lower *Main* trace combo box selectors need to be used *prior* to capturing the data.

The lower *Main* trace (shown below) allows you to capture 8 additional resources of your choice.



Note: Traces in the lower *Main* trace must be set up *prior* to a capture by using the 8 combo boxes to the left of the main trace window.

You will be able to choose from all variables and *named* analog and digital I/O in this lower *Main* trace area.

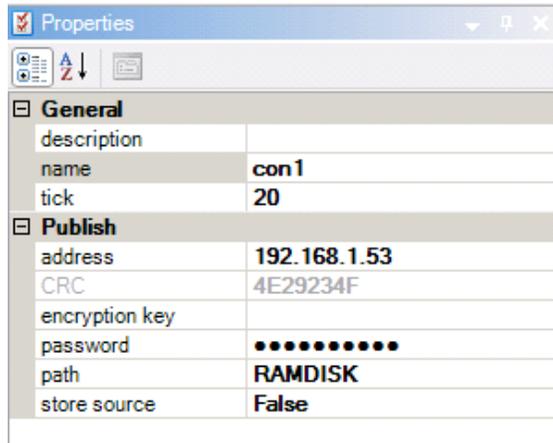


The lower Main trace window allows these 8 items to be grouped in two scalings: left and right.

- If you need to capture some analog inputs (e.g., -10 to +10V), you may want to put those on the left axis so they all have the same scale factor. Then you can use the right axis for something else, perhaps something that is not close in value to +/-10.
- The left and right axes in the *Main* trace scale independently and automatically.

2.6 Capturing Data

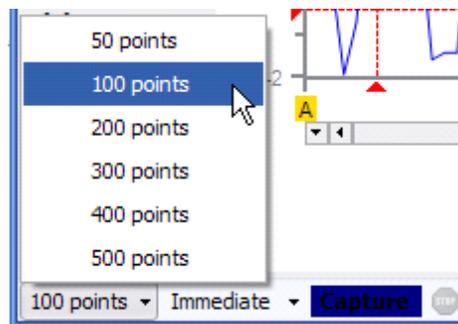
The Controller's **tick** property allows you to set the capture rate within QuickBuilder.



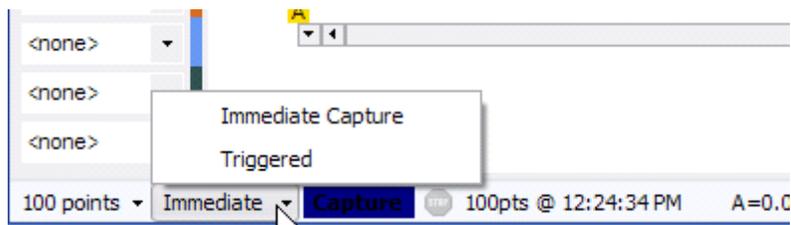
General	
description	
name	con1
tick	20
Publish	
address	192.168.1.53
CRC	4E29234F
encryption key	
password	••••••••
path	RAMDISK
store source	False

Note: Data points will be captured each tick for the 128 digital I/O as well as up to 8 variables for the lower Main trace window. Capturing this amount of data does consume processor resource and users should be careful not to set the tick rate too low, as this could impact the step execution time of the QuickBuilder program. In general, these effects are minimal for tick rates greater than 20 ms.

QuickScope's *Status Bar* allows you to set the number of points to collect during a capture.



As mentioned in the *Status bar Summary* section, there are two ways to capture data:

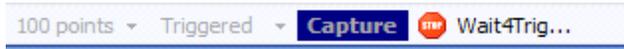


Selecting **Immediate Capture** means data will be captured when the **Capture** button is clicked.

Selecting **Triggered** means data will be captured by the QS4 program when the following statement is

generated: `$TRIGGER = 1;`

Once you select trigger mode, you must click on **Capture** in QuickScope. You will then see the following in the *Status* screen:

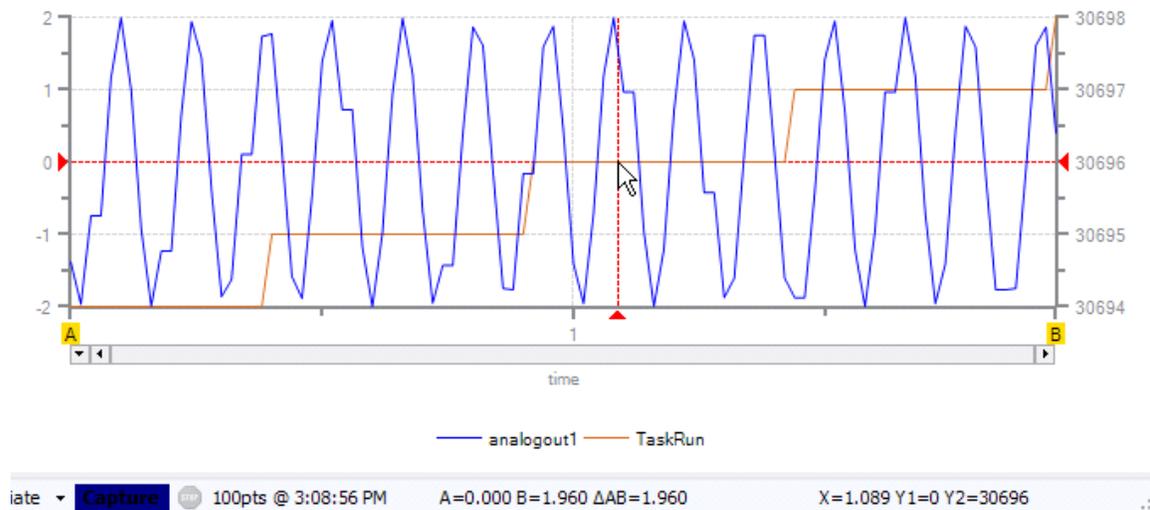


Once your Quickbuilder code initiates the trigger (`$TRIGGER = 1;`), you will see the following and QuickScope will display the captured data when it is completed:



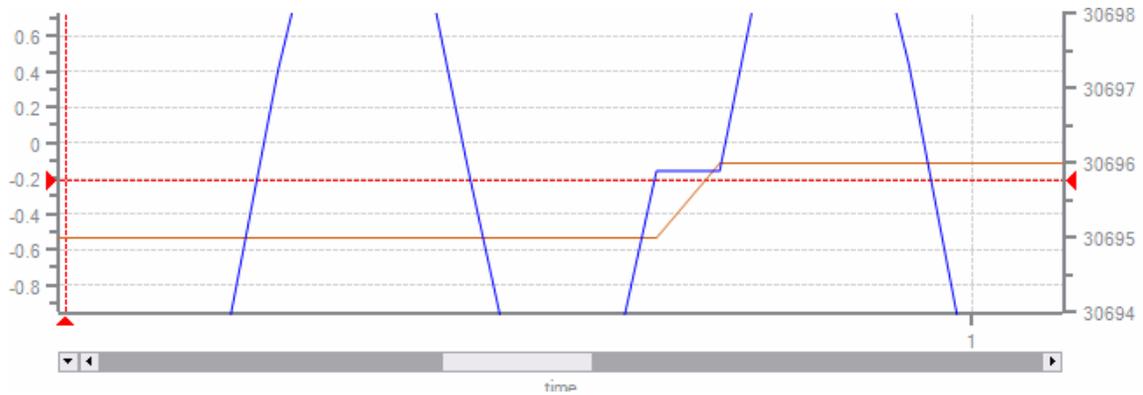
2.7 Evaluating Data

X, Y1, and Y2 values are displayed at the far right in the *Status* bar. These are used with the red crosshairs in the lower *Main* trace window. These allow you to measure the value (both X & Y) for each of the two axes of captured data. Y1 will represent your left trace Y values, and Y2 will represent your right trace Y values. When X represents time, the units will be in seconds.



2.7.1 Zoom

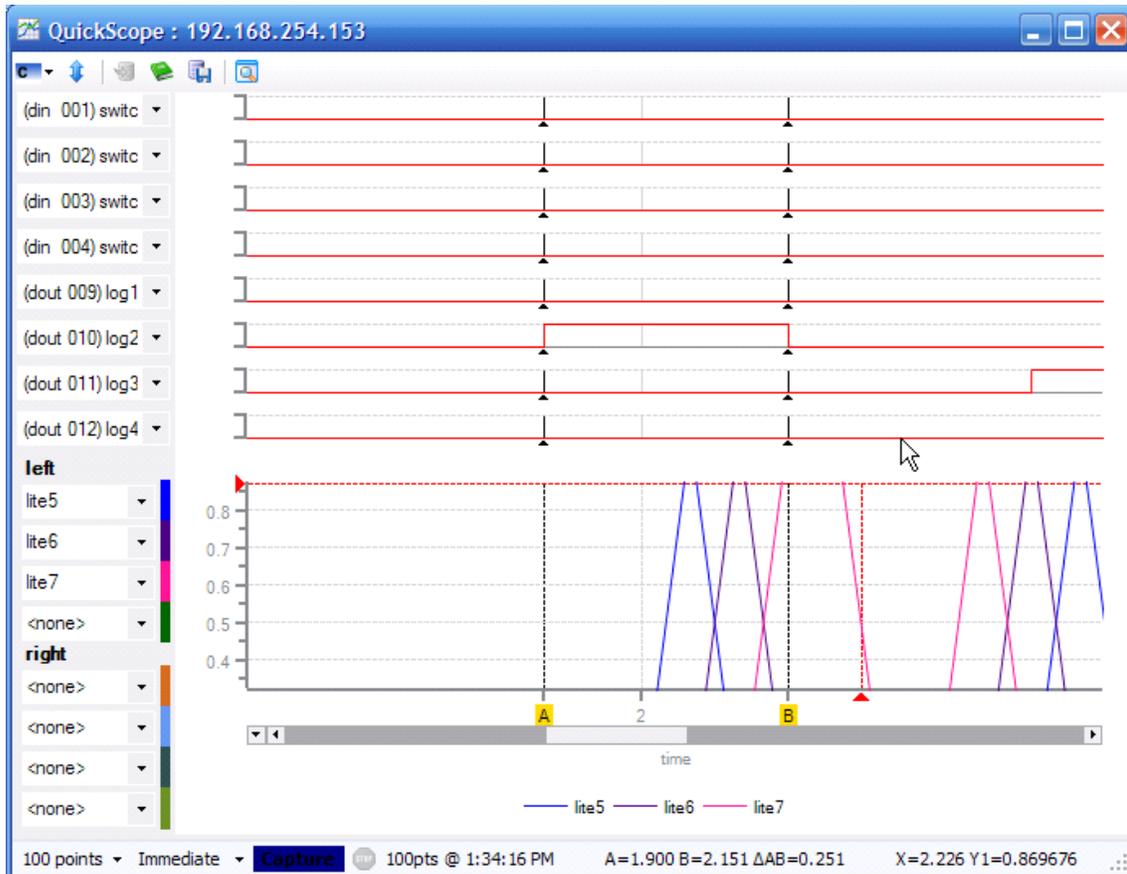
You can also zoom in to get a more precise X, Y reading to an area by clicking and dragging the two desired corners of the window you would like to zoom into.



You can zoom back out by double clicking anywhere outside the lower *Main* trace area.

2.7.2 A and B Cursors

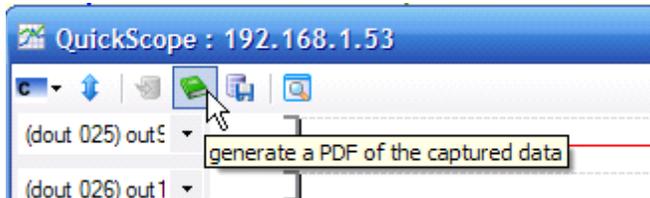
The **A** and **B** cursors are great for obtaining more precise information. In the example below, the trace has been zoomed in on and the **A** and **B** cursors have been dragged and dropped to measure the time that **log2** was on. The bottom of the *Status* bar shows the deltaAB result as being 0.251 seconds.



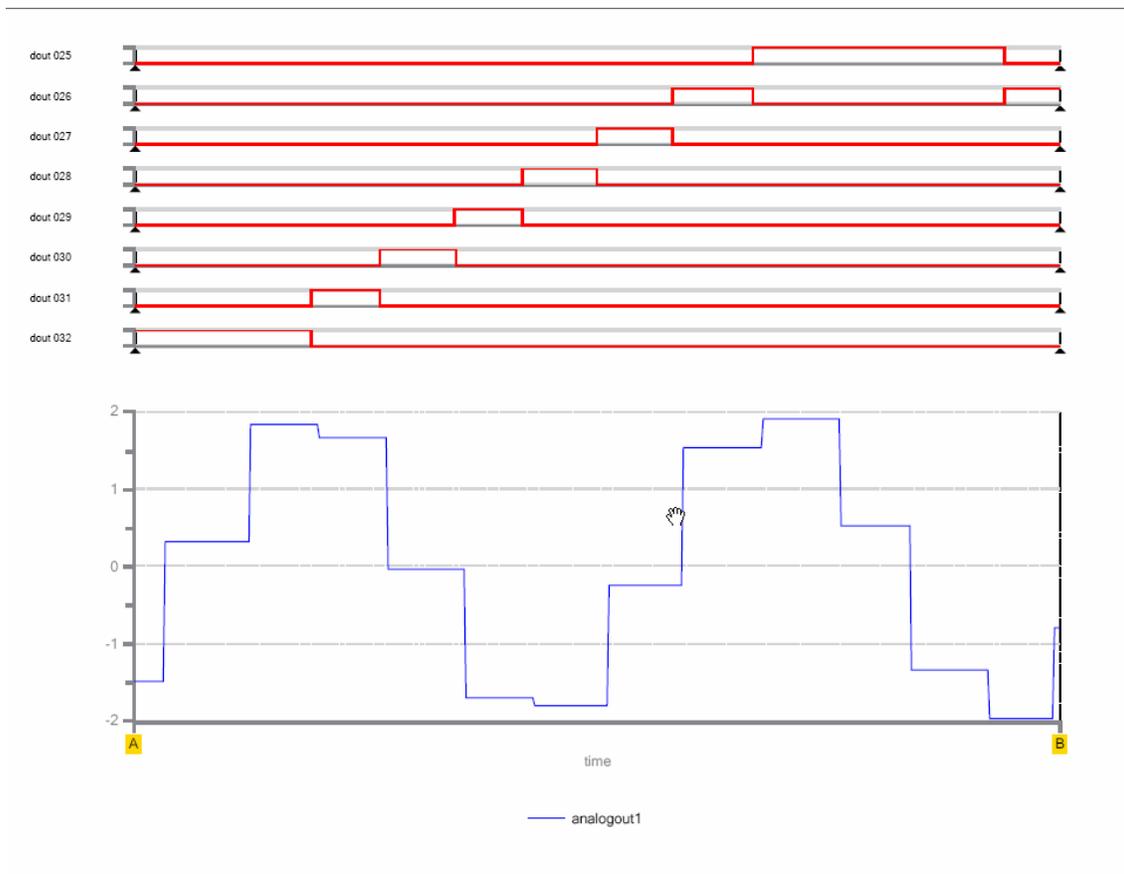
Note: When you zoom in on a chart, the yellow A and B cursor handles may not be visible. To re-align them with edges of the current view, simply click on the A and B read out area in the *Status* bar.

2.8 Creating a PDF file

You can create a PDF file using the **generate a PDF of the captured data** icon shown below:

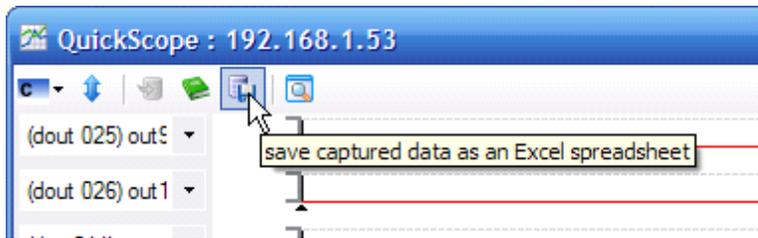


This will create a PDF showing traces of all named digital I/O in the upper trace area(s) and the selected traces in the lower trace area. If you have more than 8 named digital I/O among the first 64 inputs and outputs, your PDF will have multiple pages.



2.9 Creating an Excel Spreadsheet

You can create an Excel spreadsheet file using the **save captured data as an Excel spreadsheet** icon shown below:

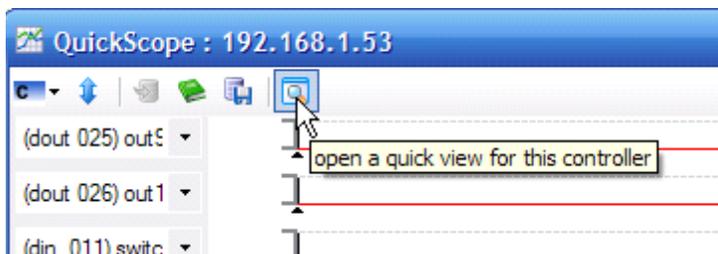


The format of the Excel spreadsheet created appears as follows (time is in units of seconds):

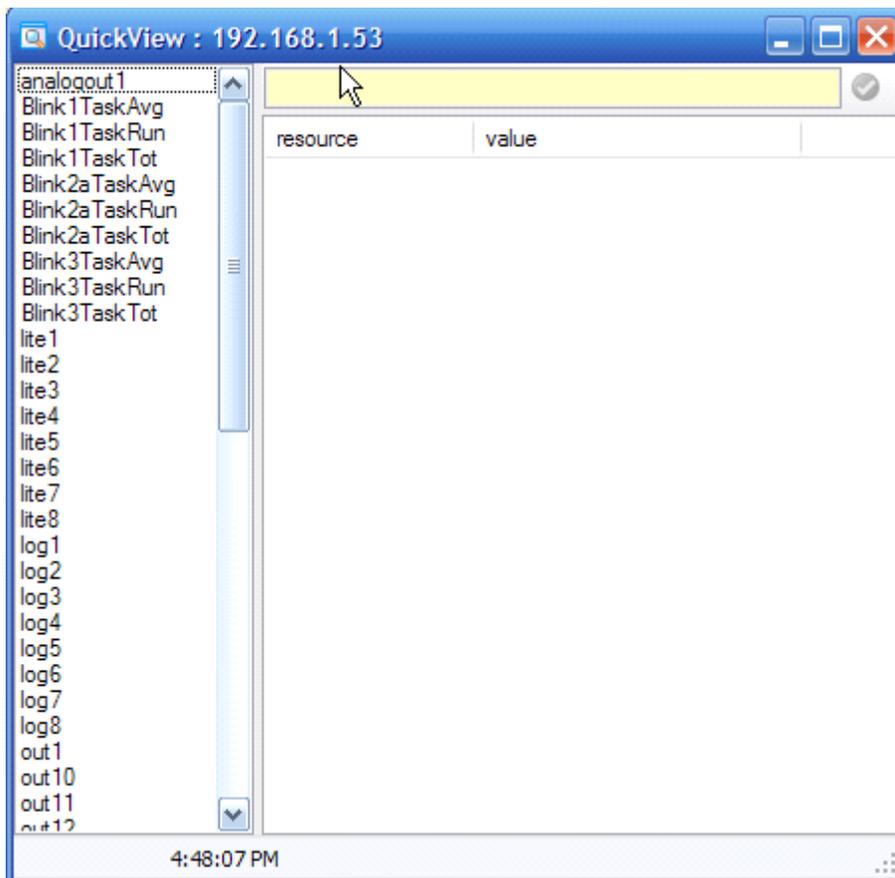
	A	B	C	D	E	F	G	
1	time	analogout1	TaskRun	<none>	switch1	switch2	switch3	sw
2	0	-1.3794	30694	0	1	0	0	
3	0.020003	-1.9639	30694	0	1	0	0	
4	0.040012	-0.74281	30694	0	1	0	0	
5	0.059998	-0.74281	30694	0	1	0	0	
6	0.080001	1.161222	30694	0	1	0	0	
7	0.1	1.99763	30694	0	1	0	0	
8	0.120006	0.997426	30694	0	1	0	0	
9	0.140004	-0.91981	30694	0	1	0	0	
10	0.16	-1.99137	30694	0	1	0	0	
11	0.180003	-1.23208	30694	0	1	0	0	
12	0.199995	-1.23208	30694	0	1	0	0	

2.10 QuickView

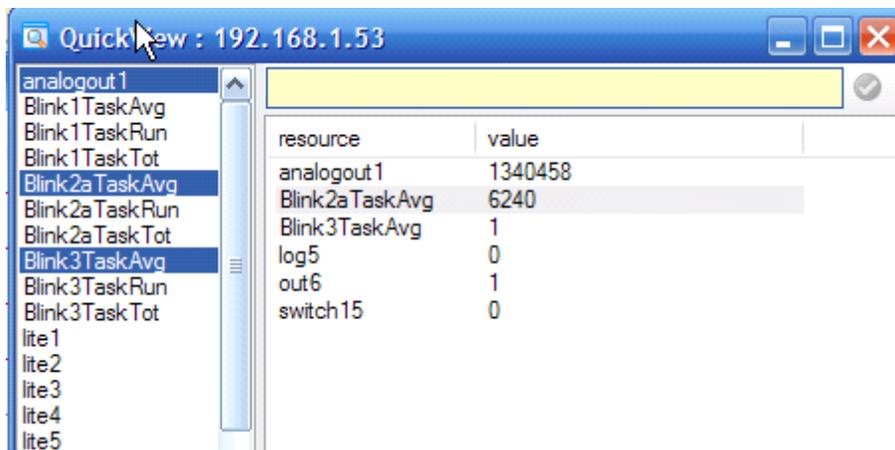
To open QuickView, click on the **open a quick view for this controller** icon from QuickScope:



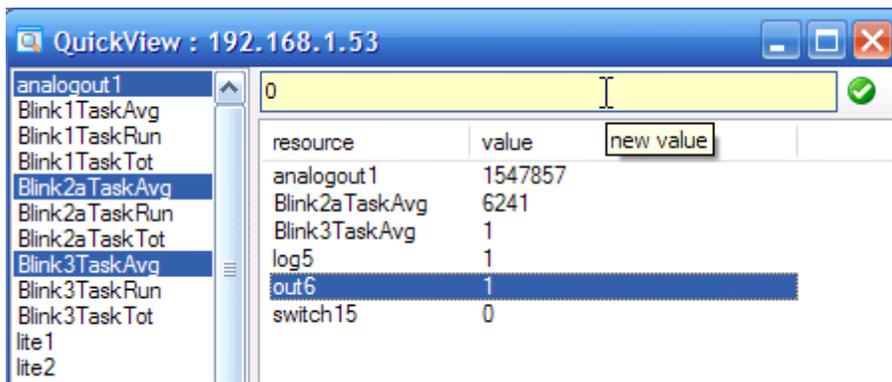
Notice the left side of the screen displays a list of all named resources.



Click on the resources you would like to monitor and they will be added to the right side of the screen along with their values as shown below.

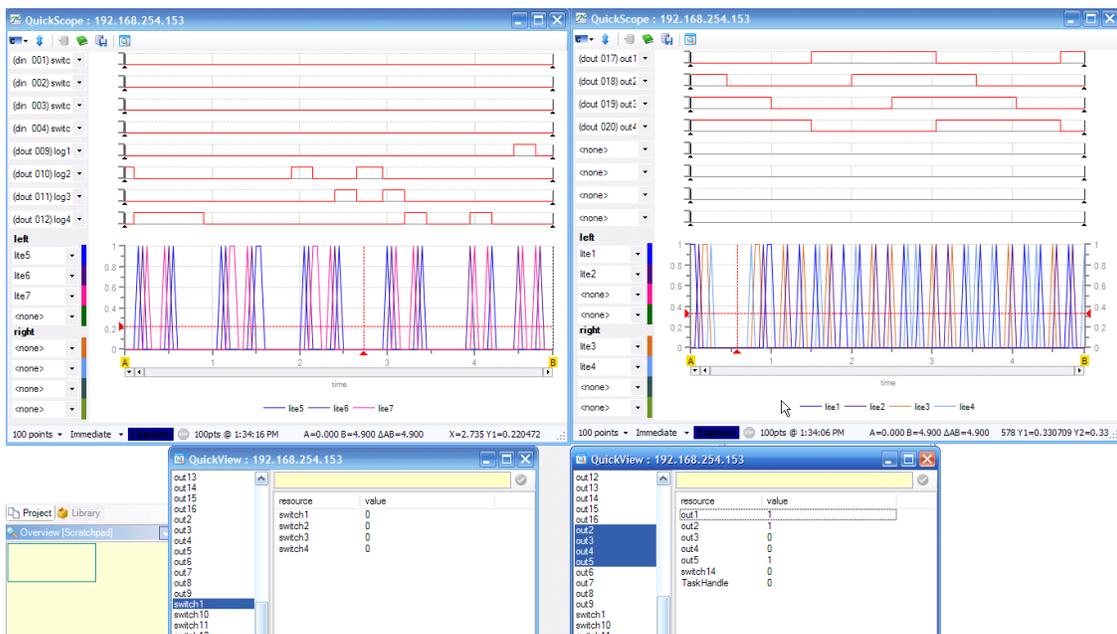


To write a value to the controller, click on the resource you want to change and then enter the new value as shown below. Then click on the green check icon.



2.11 Multiple Windows

You can open multiple instances of QS and QV as shown below. This will allow you to track more resources and monitor more than one controller at a time.



Index

- D -

document:

- general info (QuickScope Reference) 3
- version number (QuickScope Reference) 3

- Q -

QuickScope traces:

- set-up 9
- windows 9

QuickScope:

- A and B cursors 14
 - controller, connecting to 8
 - data collection rate 5, 11
 - features 5
 - immediate capture 7
 - invoking 5
 - multiple windows 18
 - overview 4
 - pdf creation 15
 - performance 5
 - reading data 12
 - status bar 7
 - tick rate 5, 11
 - toolbar 7
 - triggered capture 7
 - xls (Excel) creation 16
 - zoom feature 13
- QuickView: 5, 16
- multiple windows 18