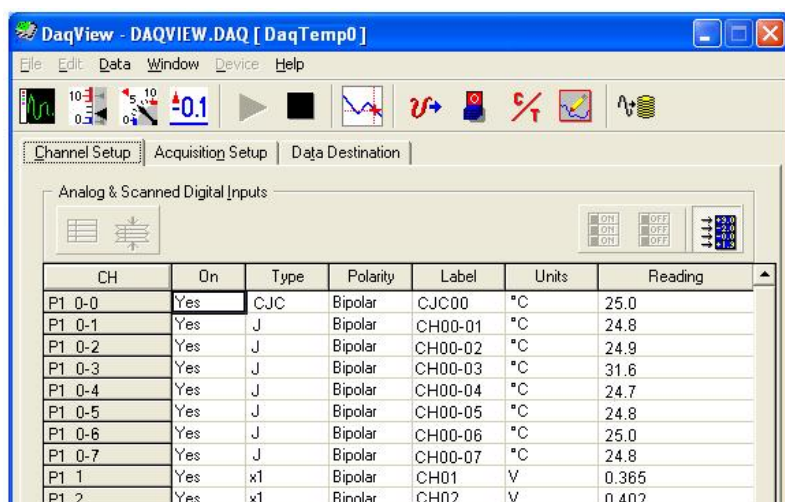


User's Guide



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DaqView & DaqViewXL for OMB-DAQTEMP

Data Acquisition Software

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The information contained in this document is believed to be correct but OMEGA Engineering, Inc. accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

WARNING: These products are not designed for use in, and should not be used for, patient-connected applications.

DaqView
and
DaqViewXL

for DaqTemp Applications

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CH	On	Type	Polarity	Label	Units	Reading
P1 0-0	<input checked="" type="checkbox"/>	CJC	Bipolar	CJC00	°C	25.0
P1 0-1	<input checked="" type="checkbox"/>	J	Bipolar	CH00-01	°C	24.8
P1 0-2	<input checked="" type="checkbox"/>	J	Bipolar	CH00-02	°C	24.9
P1 0-3	<input checked="" type="checkbox"/>	J	Bipolar	CH00-03	°C	31.6
P1 0-4	<input checked="" type="checkbox"/>	J	Bipolar	CH00-04	°C	24.7
P1 0-5	<input checked="" type="checkbox"/>	J	Bipolar	CH00-05	°C	24.8
P1 0-6	<input checked="" type="checkbox"/>	J	Bipolar	CH00-06	°C	25.0
P1 0-7	<input checked="" type="checkbox"/>	J	Bipolar	CH00-07	°C	24.8
P1 1	<input checked="" type="checkbox"/>	x1	Bipolar	CH01	V	0.365
P1 2	<input checked="" type="checkbox"/>	x1	Bipolar	CH02	V	0.402
P1 3	<input checked="" type="checkbox"/>	x1	Bipolar	CH03	V	0.296
P1 4	<input checked="" type="checkbox"/>	x1	Bipolar	CH04	V	0.363
P1 5	<input checked="" type="checkbox"/>	x1	Bipolar	CH05	V	0.325
P1 6	<input checked="" type="checkbox"/>	x1	Bipolar	CH06	V	0.329
P1 7	<input checked="" type="checkbox"/>	x1	Bipolar	CH07	V	0.150
P1 8	<input checked="" type="checkbox"/>	x1	Bipolar	CH08	V	0.288
P1 9	<input checked="" type="checkbox"/>	x1	Bipolar	CH09	V	0.243
P1 10	<input checked="" type="checkbox"/>	x1	Bipolar	CH10	V	0.208
P1 11	<input checked="" type="checkbox"/>	x1	Bipolar	CH11	V	0.218
P1 12	<input checked="" type="checkbox"/>	x1	Bipolar	CH12	V	0.189
P1 13	<input checked="" type="checkbox"/>	x1	Bipolar	CH13	V	0.220

DaqView Main Window, Channel Setup Tab Selected



DaqView can only be used with one device at a time. If you desire to use DaqView for multiple devices, you will need to run concurrent applications of the program, i.e., one for each device you want to monitor.

Overview

DaqView is a 32-bit Windows-based data acquisition program that was designed for ease-of-use; programming expertise is not required. DaqView allows you to:

- Set up system parameters.
- Save data to disk and transmit data to spreadsheets and databases.
- Automatically re-arm the trigger function and save data in new files as needed.
- Launch eZ-PostView, an independent post-acquisition data analysis program.

DaqViewXL is a Microsoft Excel-based “add-in.” The application is discussed in an independent document module that is included as part of this manual.

Starting DaqView

Minimum computer requirements include:

- Intel™ Pentium® P100, or equivalent
- 32 Mbytes of RAM
- Windows 98, Me, NT, 2000, or XP
- Data acquisition hardware

To run DaqView, double-click the DaqView icon or use your Windows desktop Start button to navigate to the program file.

Note: If acquisition hardware is not available, or you just want to explore the software, you can select *Simulated Instrument*; the main window will open (see following figure). When DaqView detects hardware, or a simulated instrument has been selected, DaqView’s main window will open.

Note: In event of a Daq device communication problem, exit DaqView and perform a hardware test from the Daq Configuration applet control panel.

A Tour of DaqView

This section includes a look at DaqView’s main window, toolbar buttons, and the spreadsheet style Channel Setup tab, which includes a Readings column.



Daq devices differ from one another in regard to functionality. Functions that are not supported by a particular board [or device] will be grayed-out.

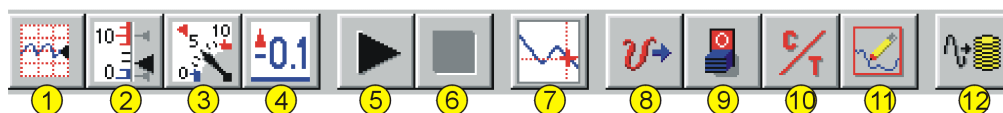
CH	On	Type	Polarity	Label	Units	Reading
P1 0-0	Yes	CJC	Bipolar	CJC00	°C	25.0
P1 0-1	Yes	J	Bipolar	CH00-01	°C	24.8
P1 0-2	Yes	J	Bipolar	CH00-02	°C	24.9
P1 0-3	Yes	J	Bipolar	CH00-03	°C	31.6
P1 0-4	Yes	J	Bipolar	CH00-04	°C	24.7
P1 0-5	Yes	J	Bipolar	CH00-05	°C	24.8
P1 0-6	Yes	J	Bipolar	CH00-06	°C	25.0
P1 0-7	Yes	J	Bipolar	CH00-07	°C	24.8
P1 1	Yes	x1	Bipolar	CH01	V	0.365
P1 2	Yes	x1	Bipolar	CH02	V	0.402

A Partial View of the Main Window

Main Window Toolbar

Each item in the main window toolbar has its own icon and is accessible from the pull-down menu. Placing the cursor on the icon and clicking the mouse button enables the tool or opens the corresponding window.

When a function does not apply, the toolbar button will be grayed-out.



Main Window Toolbar Items		
Item #	Item	Description
1	Charts	Displays the DaqView Channel Display window.
2	Bar Graph Meters	Displays a bar graph meter.
3	Analog Meters	Displays an analog dial meter.
4	Digital Meters	Displays a digital meter.
5	Start All Indicators	Starts displaying data in the Reading column and any open Chart or Meters window.
6	Stop All Indicators	Stops displaying data in the Reading column and any open Chart or Meters window.
7	View File Data	Launches eZ-PostView, an independent post-data acquisition program. The eZ-PostView application is covered by separate documentation.
8	Analog Output	Displays the Analog Output window of the DAC channels, as applicable. DaqTemp7 and DaqTemp14 have no DACs. DaqTemp7A has two DACs. DaqTemp14A has four DACs.
9	Digital I/O	Displays the Digital I/O window.
10	Counter/Timer	Displays the Counter/Timer window.
11	Waveform & Pattern Output	Displays the Arbitrary Waveform and Streamed Output windows.
12	Acquire	Activates an acquisition of data to a file.

Channel Setup Buttons

These five buttons are not a part of the main window toolbar. Instead, they reside just above the spreadsheet on the Channel Setup tab. The reason is that they only affect the channel spreadsheet.



Show All Channels, Hide Inactive Channels

These toolbar buttons collapse or expand the Analog & Scanned Digital Inputs spreadsheet to show all channels, whether active or not, or to hide those that are inactive. These commands are also available from the Edit pull-down menu.



Turn All Visible Channels On, Turn All Visible Channels Off

These toolbar buttons can turn all the channels ON or OFF at a single stroke. This feature is convenient during setup and troubleshooting or if only 1 or 2 channels must be set differently from the rest. Both these commands are also available from the Edit pull-down menu as Make All Channels Active and Make All Channels Inactive.

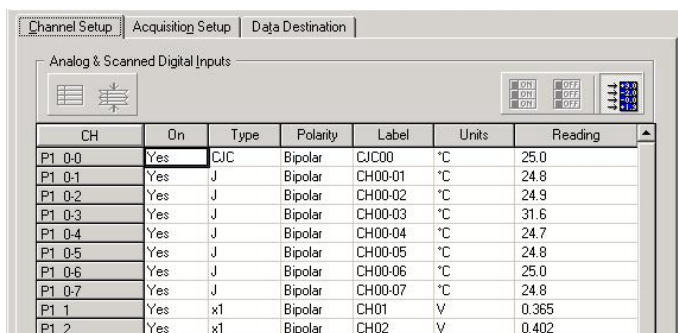


Channel Readings

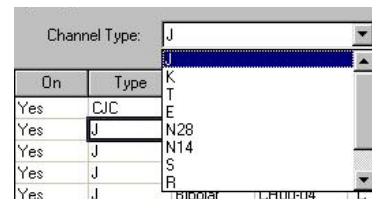
This toolbar item enables/disables the Reading column of the Analog and Scanned Digital Input spreadsheet to provide a numeric view of incoming data. This function toggles on and off when the button is repeatedly selected. Some windows require the Reading column to be disabled while changing channels or other parameters. This command is available from the Data pull-down menu as Enable Input Reading Column.

Channel Setup Window

Selecting the Channel Setup Tab displays the analog and scanned digital input channels and allows you to configure them. Each row shows a single channel and its configuration. The number of rows may vary, but each row has seven columns. Some columns allow blocks of cells to be altered at the same time (clicking a column header can select the entire column). Other columns allow only a single cell to change. The table summarizes the function of each column.



CH	On	Type	Polarity	Label	Units	Reading
P1 0-0	Yes	CJC	Bipolar	CJC00	°C	25.0
P1 0-1	Yes	J	Bipolar	CH00-01	°C	24.8
P1 0-2	Yes	J	Bipolar	CH00-02	°C	24.9
P1 0-3	Yes	J	Bipolar	CH00-03	°C	31.6
P1 0-4	Yes	J	Bipolar	CH00-04	°C	24.7
P1 0-5	Yes	J	Bipolar	CH00-05	°C	24.8
P1 0-6	Yes	J	Bipolar	CH00-06	°C	25.0
P1 0-7	Yes	J	Bipolar	CH00-07	°C	24.8
P1 1	Yes	x1	Bipolar	CH01	V	0.365
P1 2	Yes	x1	Bipolar	CH02	V	0.402



Setting Thermocouple Types for DaqTemp Channels

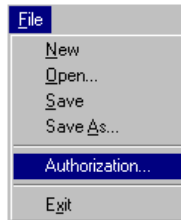
Channel Setup Tab Selected

Channel Setup Window	
Column	Description
CH	The channel number (cannot be changed from this window). This number includes the main channel number and the expansion board number and channel (if used). Expansion channels are configured using the Hardware Configuration window described later in this module.
On	This column allows you to select whether data will be collected from that channel. When a cell or block of cells in this column is selected, a selection box will appear that allows "Yes" to enable or "No" to disable the channel. Double-clicking a cell in this column will toggle the channel status. The Edit menu allows you to Make All Channels Active or Make All Channels Inactive.
Type	This column allows you to set the gain or input type [such as thermocouple type] for each channel. A block of cells in this column can be selected for multiple channels of the same type. Double-clicking a cell will select the next available gain or type.
Polarity	This column shows the channel polarity (unipolar or bipolar) for each channel. The polarity can be programmed here on a per channel basis. For selected cells that can be changed, a selection box will display "Unipolar" or "Bipolar". Double-clicking in a cell will toggle the polarity. If hardware cannot accept the polarity change, no selection box will be displayed.
Label	This column contains a descriptive name for the input channel. The default label is the channel number, but it can be changed to any 8 characters and must be unique. This label is used when selecting a channel in the analog trigger and chart selection lists.
Units	<p>This column allows you to change the engineering units of each channel and apply a linear equation to the acquired data. When a cell [or block of cells] is selected, the analog input box displays entry options in a pull-down box. Selecting "mx+b" allows you to define the scale "m", the offset "b", and the engineering units label. The "mx+b" equation is applied to the reading before it is displayed or written to disk. The "x" in the equation is the raw DaqTemp value for the selected channel.</p> <p>By default, temperature readings are in degrees Celsius (°C). However, DaqView includes "built-in" linear factors that provide automatic conversion to degrees Fahrenheit, Rankine, or Kelvin with no need for the user to enter "m" or "b" values. If desired, m and b values can be used to convert the Celsius reading to a different engineering unit, for example, to a customized non-standard unit.</p>
Reading	This column displays the device's analog or scanned digital input readings. This column cannot be altered by the user and is enabled by selecting Enable Input Reading Column under the Data menu or by selecting "Start/Stop All Indicators" under the window menu. This column will update the readings as fast as the computer will allow. The spreadsheet cannot be altered while the input reading column is enabled.

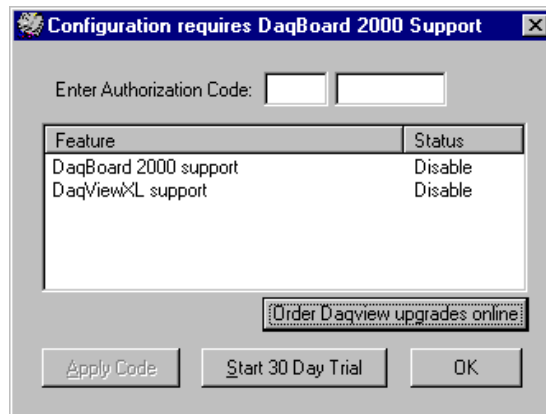
A DaqView Walk-Through

The following walk-through is intended to familiarize you quickly with aspects of DaqView not yet discussed.

(1) Open DaqView. If your DaqTemp is not connected you can select *Simulated Instrument* as your device.



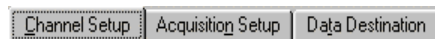
(2) From DaqView's **File** menu, select **Authorization**.



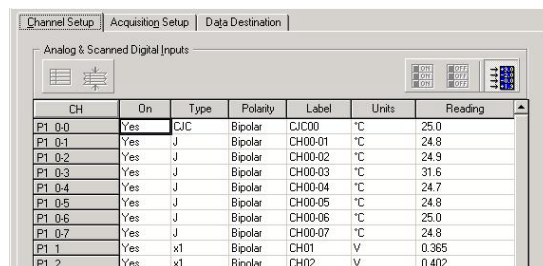
(3) If you ordered a DaqView upgrade, for example, DaqViewXL, enter the **Authorization Code** [found on a separate sheet] and click the **<Apply Code>** button.

If you have no Authorization Code you can click the **<Start 30-Day Trial>** button to enable a temporary version of an upgrade.

Note that you can order upgrades “online.”

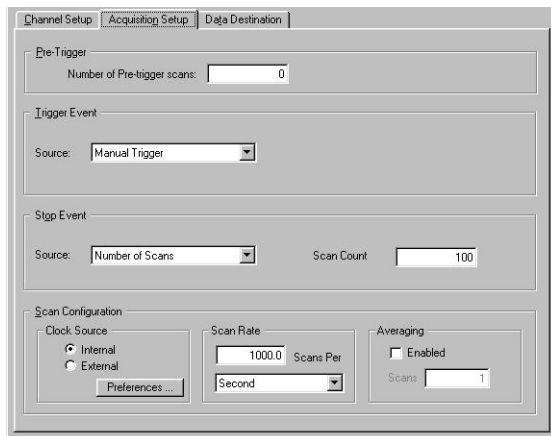


(4) To familiarize yourself with the three windows available from DaqView's main window, click the tabs **Channel Setup**, **Acquisition Setup**, and **Data Destination**.

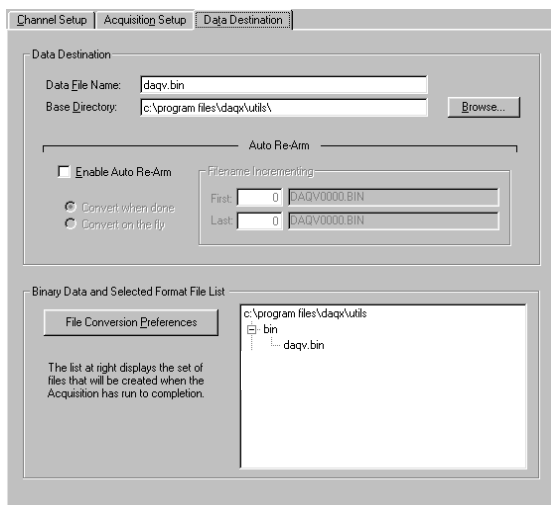


Channel Setup displays a spreadsheet for viewing and changing the configuration of analog and scanned digital input channels. Each row is dedicated to a single channel.

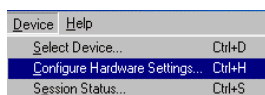
The columns and buttons pertaining to Channel Setup were discussed in the preceding sections.



Acquisition Setup displays a window that includes parameters for triggering and configuring the scan. These settings are used when an acquisition to disk is started with the toolbar's **Acquire** button. When the trigger is satisfied, scans are collected at the selected scan frequency and stored to disk in the designated file. Note that these parameters cannot be altered while an acquisition is in progress.



Data Destination provides a means of designating the desired file formats and directories for acquired data.



From DaqView's **Device** menu, select **Configure Hardware Settings**.

The window **Configure System Hardware** will appear. The right side of the screen is used to set up digital connections.

Click **OK** to return to DaqView's main window. If Channel Setup is not selected, select it at this time.



Select the **Channel Readings** button. If in the Simulated Instrument mode, the Reading column of the Analog & Scanned Digital Inputs spreadsheet will display simulated data. Selecting the **Channel Readings** button again will freeze the Reading column's display. If working hardware is connected, the readings will quantify actual signals.



To acquire data to a file, press the **Acquire** button. For simulated hardware, you will be prompted to enable a manual trigger. Binary data is acquired to a file (with default name of daqv.bin).




This button is used to launch eZ-PostView, an independent post-data acquisition program. eZ-PostView is discussed in a separate document and is included [in PDF format] on the install CD.

Acquisition Setup

Selecting the second tab of the main window displays the Acquisition Setup window. The four main parts of this window include setup parameters for triggering and configuring the scan. These settings will be used when an acquisition-to-disk is started by selecting “Acquire” (last item on the toolbar). When the trigger is satisfied, the scans are collected at the selected scan frequency and stored to disk in the designated file.

Acquisition Tab Selected

Acquisition Setup Window	
Parameter	Description
Pre-Trigger	The number of scans to acquire before the trigger event.
Trigger Event	<p>Selects the trigger source, depending on the device. Possible trigger sources include:</p> <p><i>Immediately</i> – arms and executes the trigger immediately.</p> <p><i>Key Hit</i> – arms the acquisition and waits for the user to press a key.</p> <p><i>External TTL Rising/Falling</i> – waits for a rising or falling edge slope on P1-25.</p> <p><i>Hardware Rising/Falling Edge</i> – monitors value with hysteresis on selected channel; triggers when parameter is satisfied.</p> <p><i>External TTL High/Low</i> – waits for a TTL high or low level on pin 25 of connector P1.</p> <p><i>Hardware Above/Below Level</i> – monitors value on selected channel; triggers when parameter is satisfied.</p> <p><i>Above/Below Level</i> – monitors value on selected channel; triggers when parameter is satisfied.</p> <p><i>Rising/Falling Edge</i> – monitors value with hysteresis on selected channel; triggers when parameter is satisfied.</p> <p><i>Inside/Outside Window</i> – monitors upper and lower values on selected channel; triggers when parameters are satisfied.</p> <p><i>Digital Pattern</i> – monitors 8-bit pattern on selected digital input channel; triggers when parameters (less/greater than or equal to/not equal to) are satisfied.</p>

Stop Event	<p>Selects the event that stops the scanning, depending on the device connected. Possible sources include:</p> <p><i>Number of Scans</i> - can range from 1 to 100,000,000. A scan includes all of the channels that are marked as "On" in the Analog & Scanned Digital Inputs spreadsheet.</p> <p><i>Key Hit</i> - stops acquisition when the user presses a key.</p> <p><i>Above/Below Level</i> - monitors value on selected channel; stops scan when parameter is satisfied.</p> <p><i>Rising/Falling Edge</i> - monitors value with hysteresis on the selected channel; stops the scan when the parameter is satisfied.</p> <p><i>Inside/Outside Window</i> - monitors upper and lower values on selected channel; stops scan when parameters are satisfied.</p> <p><i>Digital Pattern</i> - monitors 8-bit pattern on selected digital input channel; stops scan when parameters (less/greater than or equal to/not equal to) are satisfied.</p>
Scan Configuration	
Clock Source	<p>The Drop-down list provides the following options for DaqTemp:</p> <p><u>Internal</u> - selects the device's internal clock.</p> <p><u>External</u> - selects an external, user-supplied clock.</p> <p>The <Preferences> button brings up a Preferences box the following options for DaqTemp:</p> <p><u>Internal Clock Speed</u> - the default setting is 200 kHz.</p> <p><u>Pacer Clock</u> - Enable or disable a pacer clock.</p> <p><u>File Conversion</u> - Enable or disable a "delete Raw Binary files" notice.</p> <p><u>Calibration Table</u> - Select Factory or User calibration table.</p> <p><u>Calibration File</u> - Included on a separate disk, the calibration file fine tunes the accuracy of the device. Read the readme.txt file on the disk for more information.</p> <p><u>Zero Offset Adjustment</u> - Protects against drift.</p> <p><u>Channel Display</u> - Enables the expansion option type in the channel list.</p>
	
	<i>Preferences Box</i>
Scan Rate	<p>The scan frequency can be set in units of seconds, milliseconds, minutes, or hours via a pull-down box. Typing into the numeric field changes the rate. The maximum scan frequency is dependent on the number of channels that are enabled and whether or not averaging is enabled. Enabling more channels or averaging will lower the maximum scan frequency.</p>
Averaging	<p>The checkbox allows averaging of the analog input data to be enabled or disabled. Averaging can be used to increase the effective accuracy of a noisy signal. Averaging will increase the actual scan frequency and number of scans, but the perceived scan frequency and number of scans (which is set by DaqView) does not change.</p>

Note: These parameters cannot be altered during an acquisition.

Data Destination

Selecting the third tab of the main window displays the Data Destination window. The two parts of this window let you designate the directory for acquired data and the desired file formats.

Data Destination Tab Selected

Data Destination Window	
Parameter	Description
Data Destination	
Data File Name	Acquired data is saved to this file name. This file always has a “.bin” file extension.
Base Directory	This is the directory from which other directories are created to store the converted and acquired data. You can type in changes or use the Browse button to direct files elsewhere, including other disk drives.
Auto Re-Arm	
With the Enable Auto Re-Arm box checked, you can specify when file conversions are performed and the sequence range of incrementing file names.	
Binary Data and Selected Format File List	
File Conversion Preferences	<p>This button lets you select the format of saved data. Selections include: DIAdem, ASCII text, DADiSP, DASyLab, MATLAB, PostView Binary*, Snap-Master Binary, .wav, Universal File Formats UFF 58A (ASCII), UFF 58B (Binary), and ME Scope. The tree shows where the various formatted files will be saved on disk.</p> <p>The graphic display shows the directories and files created during acquisition. Double-clicking a directory brings up Windows Explorer. Double-clicking a file brings up any program associated with the file type.</p>

* **Note:** PostView binary is not related to eZ-PostView. The later uses a format that automatically converts. No file conversion preferences require selection in regard to eZ-PostView.

Pull-Down Menus

Some (but not all) items in the pull-down menu can also be enabled from the toolbar. Their description in the toolbar section is more detailed than presented in this section.

File

File Menu Items and Descriptions	
New	Set all parameters to their startup, default setting.
Open	Set all parameters as directed by a specified setup file.
Save	Save the existing configuration for later recall (overwrites the existing version).
Save As	Saves the existing configuration for later recall; asks whether to overwrite the original version or save under a new filename.
Authorization	Displays the Authorization window for entering the Authorization Code.
Exit	Leave the DaqView program.

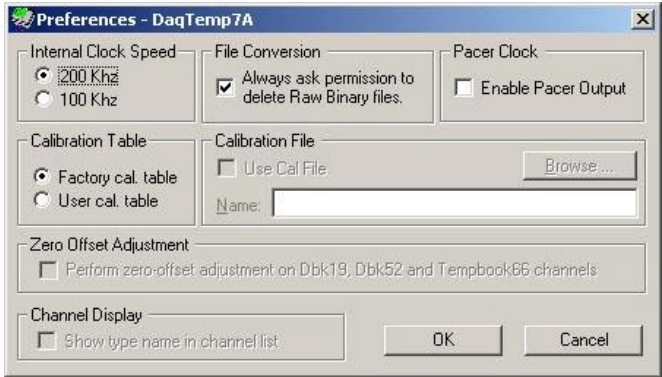
Edit

Edit Menu Items and Descriptions	
Hide Inactive Channels	This command collapses the spreadsheet to show only those channels that are turned on. It can be selected repeatedly as needed.
Show All Channels	This command shows all channels, whether turned on or off.
Make All Channels Inactive	This command places a "No" in the On field of all channels. To scan only a few channels it may be easier to make all channels inactive, then turn on the desired channels.
Make All Channels Active	This command places a "Yes" in the On field of all of the channels.
Fill Down F8	For multiple cells selected within a column, this command copies the value in the top cell to all the cells below.


Data

Data Menu Items and Descriptions	
Acquire	This command arms the hardware for an acquisition to disk. When the trigger is satisfied, the acquisition begins. All of the interactive I/O controls are disabled while the system is armed. No acquisition parameters can be altered at this time.
Convert Existing Files	During an acquisition, a raw binary file is created and updated as data is read. This command lets you convert raw binary files to the selected formats. This allows you to convert files that may not have been converted when the data was acquired.
Enable Input Reading Column	This command reads the analog inputs and scanned digital inputs and puts the numeric values in the spreadsheet in the "Reading" column. If the Reading column is already enabled, this command disables it.

Window

Window Menu Items and Descriptions	
Charts	Displays the charts window.
Bar Graph Meters	Displays a bar graph meter.
Analog Meters	Displays an analog dial meter.
Digital Meters	Displays a digital meter.
Start All Indicators	Starts displaying data in the Reading column and any open Chart or meters window.
Stop All Indicators	Stops displaying data in the Reading column and any open Chart or meters window.
View File Data	Launches eZ-PostView, a post acquisition data analysis application.
Analog Output	Displays the analog output window.
Digital I/O	N/A
Counter/Timer	N/A
Waveform & Pattern Output	Displays the arbitrary waveform and streamed output window.
Preferences	<div>Displays a preferences dialog box that shows user-selectable options regarding the particular Device model. For example, with a DaqTemp7A, the following preferences can be set.</div> <div></div> <div>The internal clock speed can be set to 200 kHz or 100 kHz. The default is 200 kHz.</div> <div>The Pacer Clock checkbox lets you enable a clock output.</div>

Device

Device Menu Items and Descriptions	
Select Device	<div>Provides a means to select an actual connected device, or a simulated instrument.</div> <div></div>

Help

The Help menu provides access to the on-line Help file.
About provides the current software version number.

Charts and Meters

When you select one of the first four buttons from the main window you access one of the following types of display window:



Charts



Analog Meters



Bar Graph Meters



Digital Meters

Each of these display options is detailed shortly. Additional tool icons in charts and meters include the following. Note that other buttons, for DaqViewXL and the post-acquisition data analysis program, are discussed later.



Faster



Slower



Pause



Reset
Peak Hold



Print



Stay-On-Top
Pushpin



Rows x
Columns



Show
Grid

Control Buttons for Charts and Meters

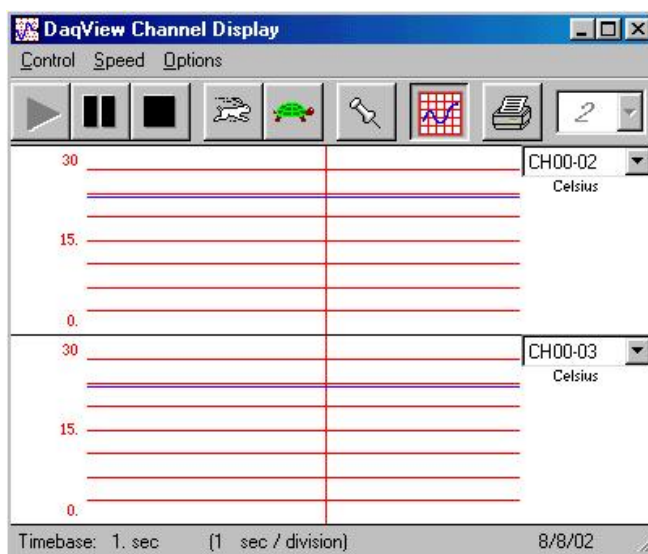


Charts

Charts displays real-time data in a strip-chart format for several channels on the DaqView Channel Display window.

Charts are enabled by selecting the triangular “Play” button on the top left (see figure). Before “playing”, at least one chart must be assigned to an active channel through the drop-down list on the right side of the chart. For the selected channel, you can change the minimum and maximum values as needed. This command can also be enabled from the Window pull-down menu.

Data is read and displayed in the charts, meters, and Readings column as fast as the computer will allow. When an acquisition to disk has begun using the *Acquire* command, the charts, meters, and the Reading column take a lower priority, updating only when there is time in the acquisition-to-disk task. Thus, the data seen in the charts may not be the same as on the disk. As the scan rate is increased, the acquisition-to-disk task will take up more processor time and the charts will be unable to keep up.

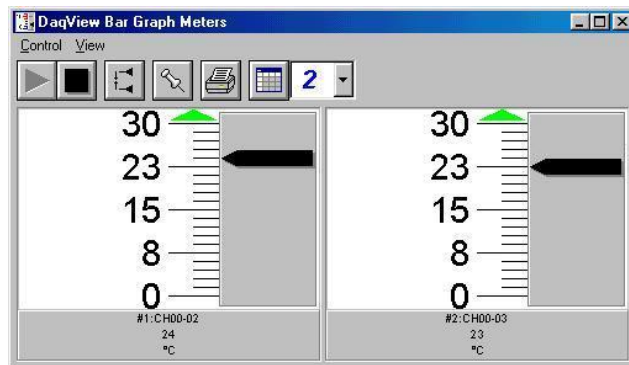


DaqView Display Charts



Bar Graph Meters

Selecting the Bar Graph Meter icon brings up the Bar Graph window to display several channels in bar graph format. To activate the display, select the Start button on the left side of the toolbar (or Start All Indicators in the pull-down menu or in the toolbar). You can vary the number of channels displayed by selecting the input box at the end of the toolbar. The Grid tool (next to last item on toolbar) is used to arrange the display for convenient reading. The pushpin icon in the center of the toolbar locks this window on top of other windows until you unlock it by selecting the pushpin again. Right-click on a meter to bring up an option menu.

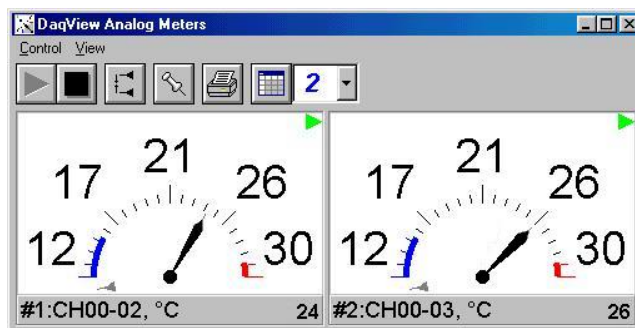


Bar Graph Window



Analog Meters

Selecting the Analog Meter icon brings up the Analog Meters window to display several channels in a dial/gage format. To activate the display, select the Start button on the left side of the toolbar (or Start All Indicators in the pull-down menu or in the toolbar). You can vary the number of channels displayed by selecting the input box at the end of the toolbar. The Grid tool (next to last item on toolbar) is used to arrange the display for convenient reading. The pushpin icon in the center of the toolbar locks this window on top of other windows until you unlock it by selecting the pushpin again. Right-click on a meter to bring up an option menu.

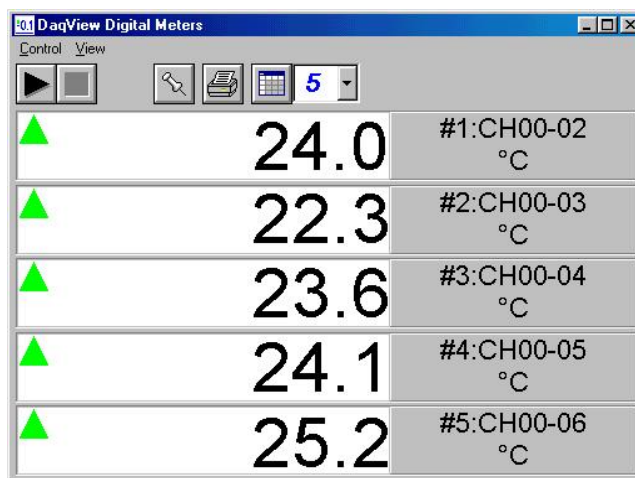


Analog Meters Window



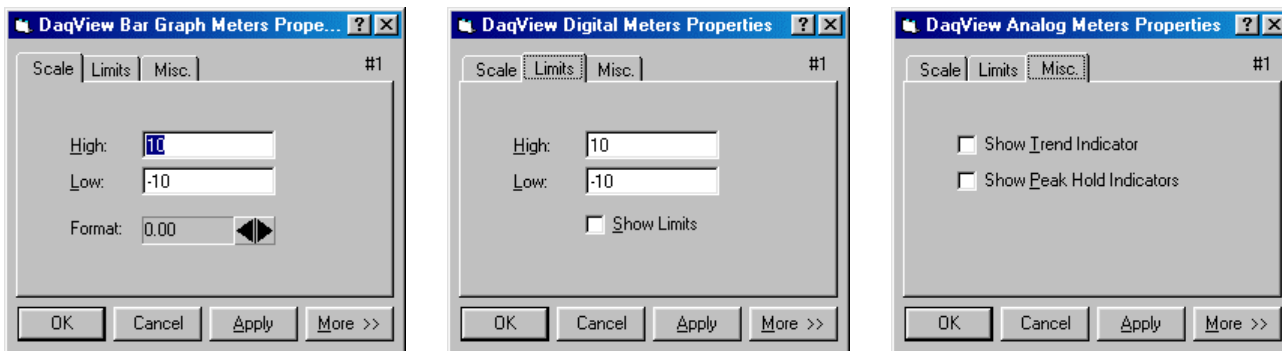
Digital Meters

Selecting the Digital Meters icon brings up the Digital Meters window to display several channels in numeric format. To activate the display, select the Start button on the left side of the toolbar (or Start All Indicators in the pull-down menu or in the toolbar). You can vary the number of channels displayed by selecting the input box at the end of the toolbar. The Grid tool (next to last item on toolbar) is used to arrange the display for convenient reading. The pushpin icon in the center of the toolbar locks this window on top of other windows until you unlock it by selecting the pushpin again. Right-click on a meter to bring up an option menu.



Digital Meters Window

Properties of Meter Windows



The meter windows simulate the look of 3 popular meter types: the bar graph, the analog dial, and the digital readout. Within each meter type, you can adjust their display properties to fit your needs. While in the meter window, **place the cursor in the display area and click the right mouse button**; then select Properties. A Properties window will appear and allow you to:

- Scale - set the high and low points and the format (number of decimal places)
- Limits - set the high and low points and whether to display these limits
- Misc - set option to show the Trend Indicator and/or the Peak Hold Indicators.

Analog Output Window

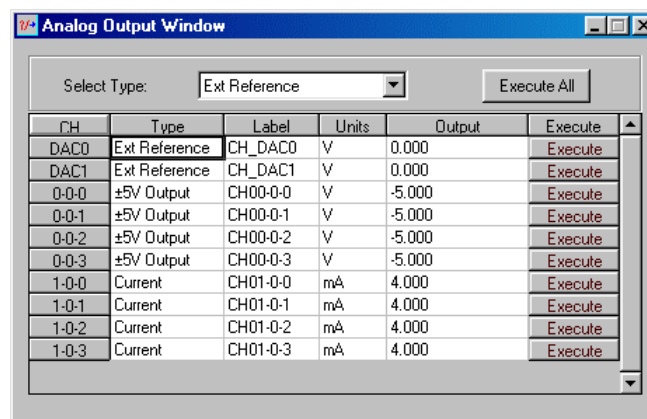


The analog output window provides interactive access to the analog outputs on the “A” series DaqTemps. DaqTemp7A has two DAC channels (DAC0 and DAC1); DaqTemp14A has four DAC channels (DAC0, DAC1, DAC2, and DAC3).

When set to the default internal reference, these outputs can be set from 0 to +10 VDC.

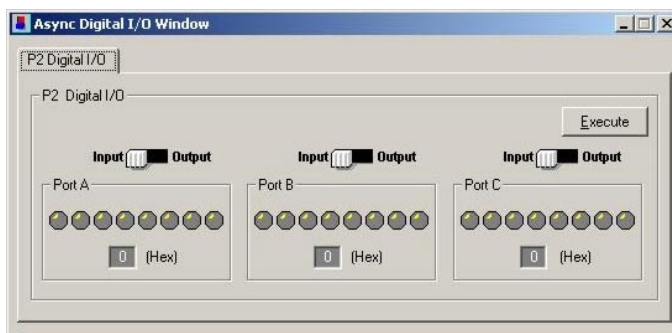
The output voltage can be with the slide control, or by placing the cursor in the numeric field and entering a valid voltage value. Selecting the *Execute* button sends the voltage values to the outputs.

The window is not available when the arbitrary waveform window is visible.



Analog Output Window

Digital I/O Window



Asynchronous Digital I/O Window – P2 Digital I/O

This window is displayed when the Digital I/O button on the main window is selected. It provides interactive control of all configured digital I/O ports (as configured in the Configure System Hardware window). The base unit has the three 8-bit ports of P2 that can be configured as either inputs or outputs.

Up to twenty 8-bit ports can be accessed when expansion boards are added. When the *Execute* button is pressed, all ports configured as outputs will be updated and all input ports will be read.

Counter/Timer Window

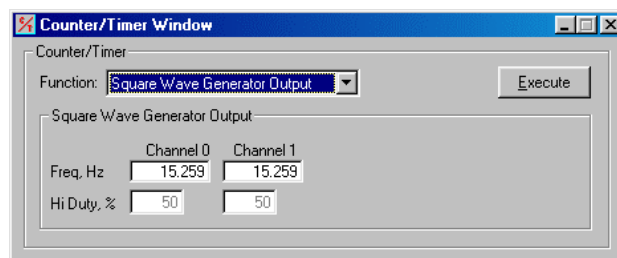


Two C/T modes are available for the DaqTemp devices.

- **Totalize Input** – Counts rising or falling edges of signals from the related pin on P3 adapter. Each channel has its own Reset button.



- **Square Wave Generator Output** – Outputs a square wave on each of 2 channels with a selectable frequency and duty cycle.



Note: Channels that are enabled in the scan cannot be used from the asynchronous counter/timer window.

Waveform & Digital Pattern Output Window



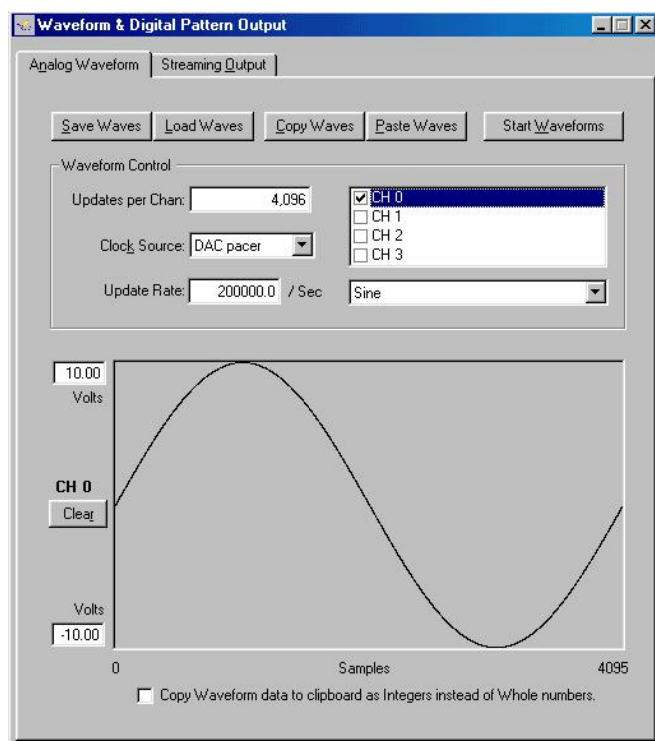
The “A” series DaqTemp models have a waveform mode for their analog output channels. DaqView allows the DACs to be configured in interactive mode or waveform mode.

With “A” series DaqTemps, both the *Analog Waveform* and *Streaming Output* tabs are enabled.

- Selecting the **Analog Waveform** *tab* accesses the standard analog output window.
- Selecting the **Streaming Output** *tab* accesses the arbitrary waveform window.

Note: This window is not available when the analog output window is visible.

The following material identifies the functions of various buttons and regions of the window. Refer to the screen shot at the right as needed.



**Waveform and Digital Pattern Output Window –
Analog Waveform Tab Selected**

In the **Waveform Type** box, you can select a standard function generator waveform (sine, square, triangle, sawtooth) or a freehand drawing. In Freehand, move the mouse to the waveform window and draw a waveform using the left mouse button.

The **Save Waves** button allows you to save the values of each displayed waveform to disk in an ASCII format. The files created are compatible with spreadsheets and word processors, allowing you to numerically inspect and/or alter the saved waveforms.

Sample Waveform File Format Examples	
One Channel	Two Channels
2043<CR>	2432<TAB>293<CR>
1019<CR>	394<TAB>345<CR>
300<CR>	2934<TAB>3456<CR>
923<CR>	743<TAB>875 <CR>

In the two-channel example (to the immediate left), the entry preceding the <TAB> is for the first channel and the entry after the TAB is for the second channel.

The **Load Waves** button reads any ASCII file of numbers up to the number of points specified in the Updates per Channel field.

The **Copy Waves** and **Paste Waves** buttons use the system clipboard to post and receive waveform data from all DAC channels. The data formats are identical to the Save and Load operations. Copy and Paste are recommended for use with spreadsheets to numerically inspect and/or modify waveforms. Waveforms can also be copied and pasted from the popup menu that is displayed when the mouse is right clicked over the Waveform display. The waveform selected in the DAC selection listbox is the target of the Cut or Paste. If multiple channels of data are on the clipboard, you can select the one that you want to paste into the selected DAC channel.

The size of the memory buffer allocated for each DAC channel is determined by the number of updates that you specify. Different Daq devices have different limits on the maximum updates that can be specified.

You can select one of three **clock sources** to pace the DAC output. The three options are as follows:

- **DAC Pacer** with a rate set in the Sample Update Rate field. When using the DAC pacer, the Update Rate field controls the speed at which the DAC is updated.
- **Acq Pacer**, the clock used by the analog input section of the DaqBoard. Using the Acq pacer clock synchronizes the update of the DAC output with the analog input data collection.
- **External TTL**. Update rate is controlled by the rate of the clock signal applied to the external input pin.

Note: If the DAC Pacer clock is selected, you must enter the update rate that paces the DAC outputs.

The selection for the DAC channel for which you want to create a waveform, is made in the **DAC selection listbox**. From the same listbox you can control the channel's output by clicking the checkbox on or off. Note that DaqTemp7A, having two DACs allows for two channels to be selected. DaqTemp14A allows for up to 4 DAC analog output channels to be selected. The non-"A" series (DaqTemp7 and DaqTemp14) have no DACs.

In the **Waveform selection box**, you can select a standard function generator waveform (sine, square, triangle, sawtooth) or an arbitrary freehand drawing. In arbitrary mode, move the mouse to the waveform window and draw a waveform using the left mouse button. The drawn waveform will be loaded into the channel selected in the DAC channel listbox. You can also create a waveform by right clicking the mouse with the cursor over the waveform window. Select the waveform type from the resulting popup menu. Repeat this process for each channel in the DAC selection listbox.

To start the waveforms playing on the DACs, click the **Start Waveforms** button.

Auto Scale Waveform

DaqView provides an easy method to determine the upper and lower extents of the selected DAC waveform. Simply right click the mouse over the Waveform display, and select the Auto Scale item from the popup menu. DaqView scans the waveform for the highest and lowest values, then sets the upper and lower waveform range fields to these values. This causes the waveform to be displayed full scale within the waveform display.

This is useful if the waveform is off scale on the high or low end (indicated by the range input field color set to red) and you want to bring it back to a full scale view.

Auto Fit Waveform

The DaqView Auto Fit feature is similar to Auto Scale. However, Auto Fit causes the data to be re-scaled so it fits full scale in the range defined by the values in the upper and lower range input fields.

Note: For some Daq hardware, when hardware triggering has been selected to trigger an acquisition, DAC1 is used internally to supply the desired threshold voltage. In this case, CH 1 is not available for waveform output. The *Copy Waves* and *Paste Waves* buttons use the system clipboard to post and receive waveform data. The data formats are identical to the Save and Load operations. Copy and Paste are recommended for use with spreadsheets to numerically inspect and/or modify waveforms.

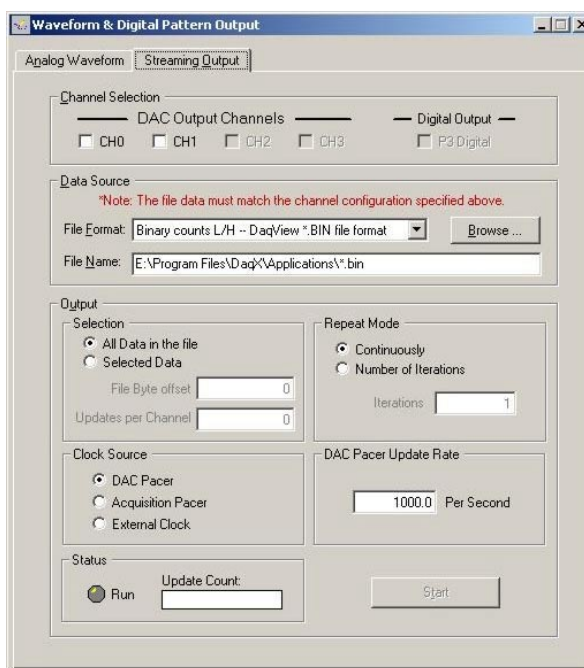
To start the waveforms playing on the DACs, click the *Start Waveforms* button.

Note: When the analog input section is set for analog input triggering, DAC1 is used internally to supply the desired threshold voltage. In this case, DAC1 is not available for waveform output.

For DaqTemp7A and DaqTemp14A only:

Selecting the **Streaming Output** tab brings up the window to configure continuous streamed output via one or more DACs, or digital outputs via the P3 16-bit port.

- Analog or digital output is chosen from the Data Selection section of the Streamed Output window.
- The Data Source section selects the file name and type (ASCII or binary).
- Within the Output Control section, you can select to send all samples or a portion, and whether to continuously repeat or stop after a specified count.
- The clock source can be an internal or external DAC clock, or an internal or external pacer clock.
- The *Start* button initiates a streamed output.



**Waveform & Digital Pattern Output
Streaming Output Tab Selected**

Acquire



The Acquire selection activates an acquisition of data to file. The *Event* option under the *Trigger Setup* portion of the Main window determines when the Acquire process is initiated. The *Event* selections are detailed in the *Acquisition Setup* section of this chapter. After Acquire is selected, the process is automatic beginning with the *DaqView Armed* screen. This screen posts the *Trigger Armed* time as well as the *Trigger Event* information. The Acquire process makes use of the *Data File Setup* parameters to format data collection.

Once the *Trigger Event* occurs, the *DaqView Triggered* screen appears. This screen allows you to witness the data sampling parameters you set in the Main window prior to initiating the Acquire process as well as the progress of the data acquisition.

If file conversion is selected, the Acquire process concludes by converting the generated .BIN file from binary to ASCII data. The resulting file is saved under a user-specified directory and file name or, by default, under the DaqView subdirectory as DAQV.TXT. This .TXT file is available for data processing or analysis by various software packages such as DaqViewXL.

DaqViewXL

- Overview1**
- Program Requirements1**
- Installation of DaqViewXL Software2**
- Basic Function of DaqViewXL2**
 - Configuring an Acquisition3
 - Data Header3
- Hints and Tips for DaqViewXL4**

To run a trial version of DaqViewXL, select "Authorization" from DaqView's File Pull-down Menu, then click the 30 day trial button.

Overview

DaqViewXL is a Microsoft Excel add-in that provides complete setup and data acquisition within Excel under Windows 98, Me, NT, 2000, or XP. Acquired data is immediately placed in an active spreadsheet, updating cells and graphics. Data is then analyzed and graphically displayed. DaqViewXL:

- Augments Microsoft's Excel spreadsheet software with data acquisition capability
- Provides strip-chart graphics for real-time data display
- Automatically converts data to engineering units

Once DaqViewXL is installed within Excel, the spreadsheet provides a toolbar that contains all the data acquisition controls. This DaqViewXL tool bar (also accessible from Excel's menu) can enable all configuration and data acquisition tasks. The features of Excel and DaqView are seamlessly combined to form a powerful data acquisition solution.

DaqViewXL performs like DaqView despite a slightly different user-interface. To set up your data acquisition system, you just click on the Configure button in the Excel tool bar. DaqViewXL's main window appears with all of the controls required to configure data acquisition including setting up input and output channels on an easy-to-use grid. Each column of the channel-configuration grid corresponds to specific parameters in the data acquisition system and allows you to set these parameters on a per-channel basis.

You can obtain automated reports by taking advantage of the Software Components concept. For example, you can embed an Excel spreadsheet object into a Word document. When the spreadsheet object is activated, it gives you access to DaqViewXL. In this case, the Word document holds all text, as well as an embedded Excel spreadsheet object that holds raw and calculated data and graphics. Double-clicking on the Excel object in Word can access DaqViewXL to efficiently prepare a statistical report. This compound document allows you to collect, configure, analyze, graph, and annotate data with a few clicks of a mouse button.

Program Requirements

DaqViewXL requires the following software:

- IOtech DaqBook/DaqBoard Series driver version 5 or later.
Installed components must include DaqView version 7.7.25 or later.
- Microsoft Excel 97 or later
- Microsoft Windows Operating System (Windows 98, Me, NT, 2000, or XP)

Installation of DaqViewXL Software

DaqViewXL is an option in DaqView that can be enabled by entering an appropriate authorization code into DaqView's product registration dialog. DaqViewXL can also be enabled for a 30-day trial period by pressing the "Evaluation" button in the same dialog.

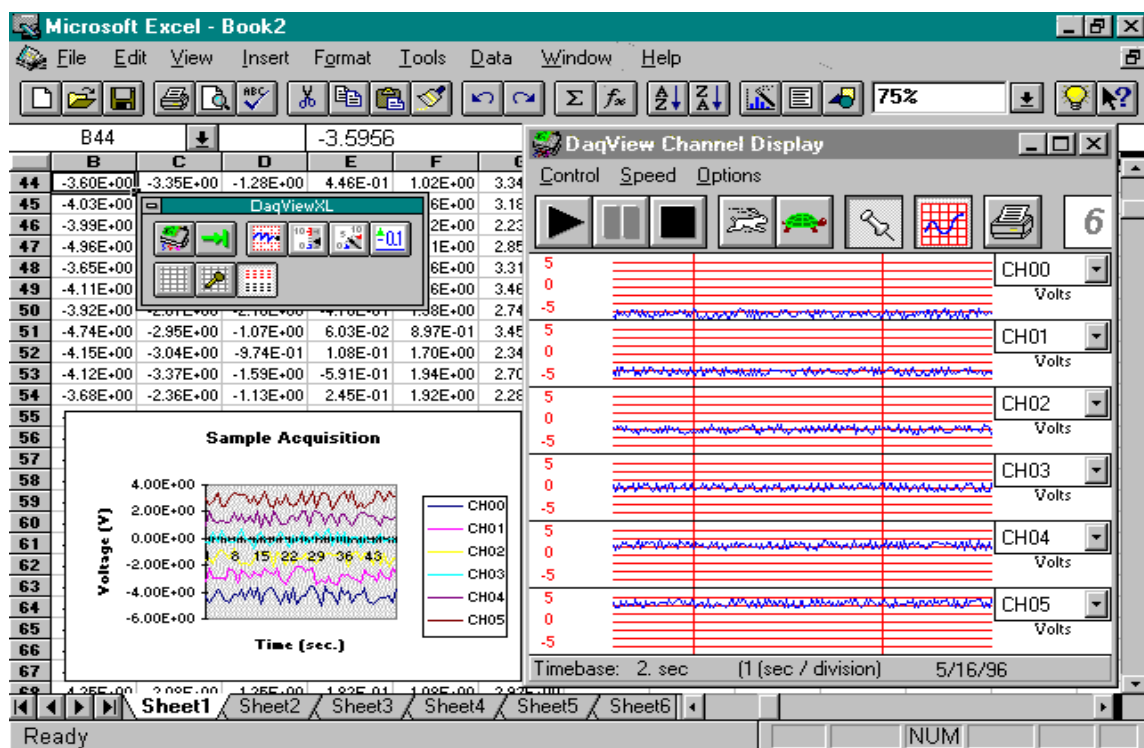
The ability to run DaqViewXL can be verified by checking the option status in DaqView's "About" dialog.

To run DaqViewXL, simply start Excel and open the Daqviewxl.xls macro. You may be prompted about the workbook containing macros. This is OK. The DaqViewXL file uses Excel macros to communicate with DaqView. Click the "Enable macros" button to continue.

To enable the DaqViewXL toolbar, click View-Toolbars-DaqViewXL. You can position this toolbar just like any other Excel toolbar.

Basic Function of DaqViewXL

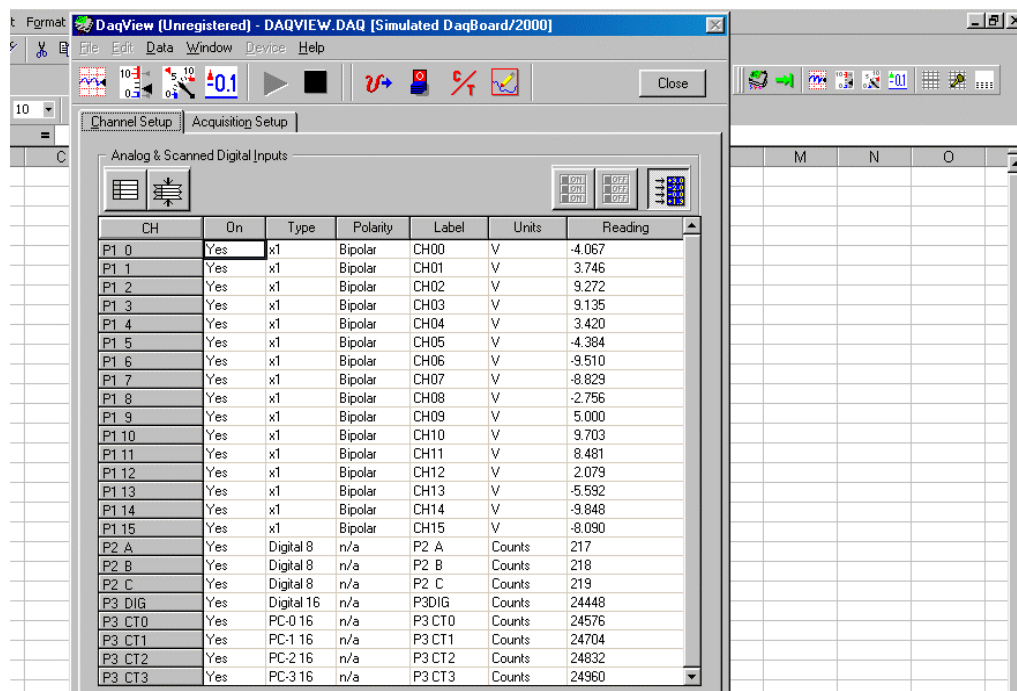
DaqViewXL performs much like the standard DaqView. With Excel's macro capabilities, you can tailor DaqViewXL to meet various requirements. Your knowledge of Excel will help you use all its tools for better data acquisition and processing. The following sections give you the basics of how DaqViewXL can organize and analyze your data. These basic ideas will give you the ability to explore all DaqViewXL has to offer. The discussion mirrors previous sections and highlights the differences between DaqViewXL and DaqView. The *Hints and Tips* section gives you tools and suggestions to improve your productivity with DaqViewXL.



DaqViewXL Toolbar and Displays

Configuring an Acquisition

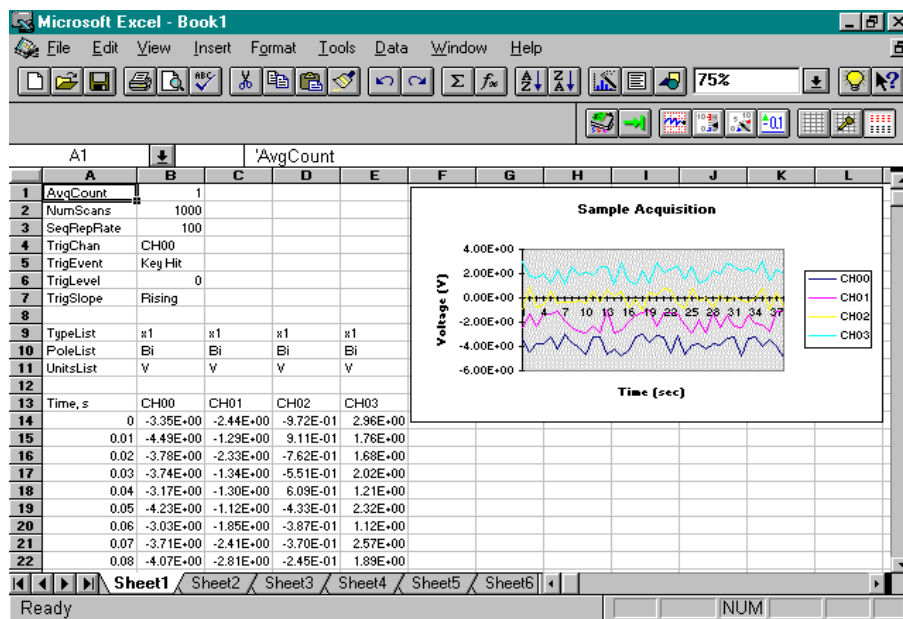
After installing DaqViewXL and entering Excel, click the *Configure...* icon (first in the DaqViewXL toolbar) to set up your system. This launches DaqViewXL's main screen (see following figure). This screen is slightly different from the stand-alone version shown at the beginning of the chapter. (Specifically, DaqViewXL does not have a PostView or DIAdem button—Excel performs those functions better. Also, the Go button is now the 2nd button on the toolbar window rather than the main screen.) The earlier discussion of DaqView configuration still applies.



DaqView Screen Within Excel

Data Header

DaqViewXL's optional data header supplies the global acquisition parameters and the configuration of each channel and places this information directly in the spreadsheet along with acquired data. This information includes channel gain or thermocouple type, bipolar/unipolar setting, units, and channel label. To activate Data Headers select the *Use Data Headers* icon in the DaqViewXL toolbar.



DaqViewXL Data Header

Hints and Tips for using DaqViewXL

- Do not run DaqView first and then try to use DaqViewXL. When DaqViewXL runs, DaqView is put into a special "server" mode which supports transactions with "client" applications such as Excel. Normally DaqView does not run in this mode and cannot support DaqViewXL.
- When you acquire data into a worksheet, some of the data may be displayed as a string of hash marks (e.g. #####). Excel will do this whenever the column is not wide enough to display all the digits of a number. To eliminate the hash marks, just widen the column. An easy way to do this is to use the "Format, Column, Auto Fit Selection" menu command. Immediately after an acquisition, all the rows and columns of data are selected. Click this menu item to automatically fit all the columns to the new data.
- You can start an acquisition from an Excel macro as shown in the following VBA macro code example:

```
Sub Macro1()  
    Application.Run Macro:="menuGoDoIt"  
End Sub
```

This is equivalent to clicking the Go! button on the DaqViewXL toolbar. It arms the hardware for an acquisition, and if DaqView is set up to trigger on "External TTL" or "Channel Value", the acquisition will take place automatically when the trigger condition is met. For acquisitions configured to trigger on a "Key Hit", the acquisition will not start until the user presses the "Manual Trigger" button on the "DaqView Armed" dialog box.

To automatically press this button after arming DaqView use the following macro:

```
Sub ArmAndKeyHit()  
    Application.Run Macro:="menuGoDoIt" 'presses the Go! button  
    SendKeys "{ENTER}" 'presses the space bar  
End Sub
```

This macro will start a "Key Hit" acquisition immediately.

Note: Macro1, shown above, was generated by Excel's macro recorder.

- If you chose to customize DaqViewXL's toolbar, you should avoid removing buttons. If DaqViewXL detects missing buttons it will prompt you to allow it to remove the toolbar and recreate it with all buttons. You can decline to do so, but DaqViewXL will continue to ask you to recreate the toolbar each time it starts-up. You can add buttons, rearrange them, and re-size the toolbar without getting this prompt.
- If DaqView cannot connect to your hardware on start-up, it will automatically switch to the Simulated Instrument mode when loaded from DaqViewXL.



WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA Warranty adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

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The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

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2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. P.O. number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

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- ☑ Benchtop/Laboratory Meters
- ☑ Controllers, Calibrators, Simulators & Pumps
- ☑ Industrial pH & Conductivity Equipment

DATA ACQUISITION

- ☑ Data Acquisition & Engineering Software
- ☑ Communications-Based Acquisition Systems
- ☑ Plug-in Cards for Apple, IBM & Compatibles
- ☑ Datalogging Systems
- ☑ Recorders, Printers & Plotters

HEATERS

- ☑ Heating Cable
- ☑ Cartridge & Strip Heaters
- ☑ Immersion & Band Heaters
- ☑ Flexible Heaters
- ☑ Laboratory Heaters

ENVIRONMENTAL MONITORING AND CONTROL

- ☑ Metering & Control Instrumentation
- ☑ Refractometers
- ☑ Pumps & Tubing
- ☑ Air, Soil & Water Monitors
- ☑ Industrial Water & Wastewater Treatment
- ☑ pH, Conductivity & Dissolved Oxygen Instruments