# *DaqView*
# *and*
# *DaqViewXL*

# DaqView

**All Users:**

**DaqView can only be used with one device at a time.**

**For use with multiple DaqBoard/2000 Series or DaqBook/2000 Series devices, via custom programming, refer to the *Programmer's Manual* (1008-0901), chapter 3, *Using Multiple Devices*.**

**TempBook Users:**

**TempBook devices do not make use of DBK cards or DBK modules, nor do they make use of certain DaqView functions. TempBook users should skip over material that is identified as "not applicable to TempBook."**

## Overview

DaqView is a 32-bit Windows-based data acquisition program that can be used to operate DaqBook/2000 Series devices, DaqBoard/2000 Series boards, ISA-type DaqBoards, DaqBook/100/200 Series devices, Daq PC-Cards, and TempBooks.

Daq devices typically make use of optional DBK cards and modules. TempBooks are never used with DBK cards or modules.

### Note: TempBook does not make use of optional DBK cards or DBK modules.

DaqView was designed for ease-of-use; programming expertise is not required. DaqView allows you to:
- Set up system parameters (selecting channels, gains, transducer types, etc) to acquire data.
- 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.
- Configure and operate the DBK option modules. **Does not apply to TempBook.**
- Configure the counter/timer into one of three modes for measuring frequency, totalizing, or generating pulse trains. **Does not apply to TempBook.**
- Use analog outputs, including waveform generation, for DaqBoard/2000, /2001, /2003, /2004, DaqBoard/2000c, /2001c, /2003c, /2004c, and DaqBook/2000 Series devices, providing that the later have a DBK46 option installed. **Does not apply to TempBook.**
- Use digital I/O (for Daq devices with digital I/O). **Does not apply to TempBook.**

**A Post Acquisition Data Analysis Program**, if installed, can be launched from DaqView to view, measure, and edit data. eZ-PostView is an example of a post data acquisition analysis program.

**DaqViewXL** is a Microsoft Excel-based "add-in." The application is discussed in a separate document module that is included as part of this manual.

## Starting DaqView

Minimum computer requirements include:
- Intel$^{TM}$ Pentium$^®$ P100, or equivalent
- 32 Mbytes of RAM
- Windows 95/98, Windows NT 3.51, Windows NT 4.0, Windows 2000, Windows XP, Windows Me.
- 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.

The following figure shows DaqView's main window for a DaqBoard/2000. The table identifies the toolbar buttons, and other buttons that are visible when the Channel Setup Tab is selected [as in the following figure].

## A Tour of DaqView

This section includes a look at DaqView's main window, a discussion of functionality for DaqBoard/2000 Series, DaqBook/2000 Series, and TempBook, and steps for completing a self-tour of DaqView. The tour will acquaint you with several of the application's basic features.

# A Look at the Main Window

**Note!** 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.
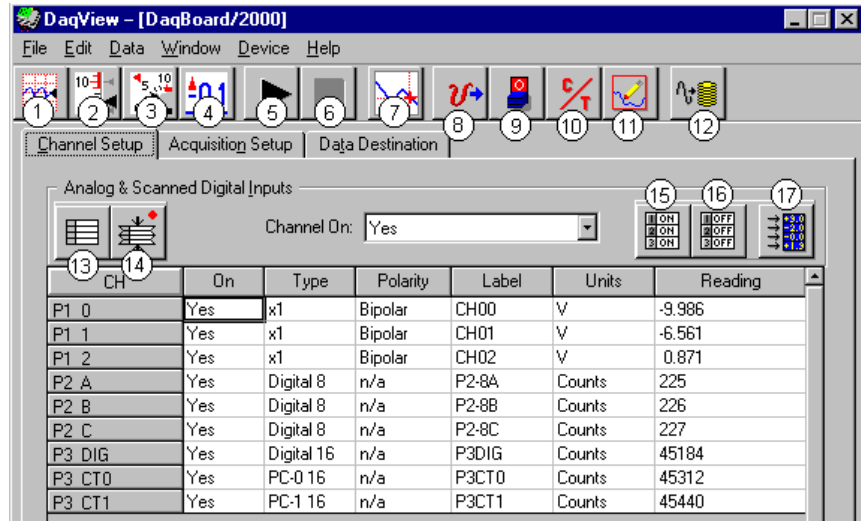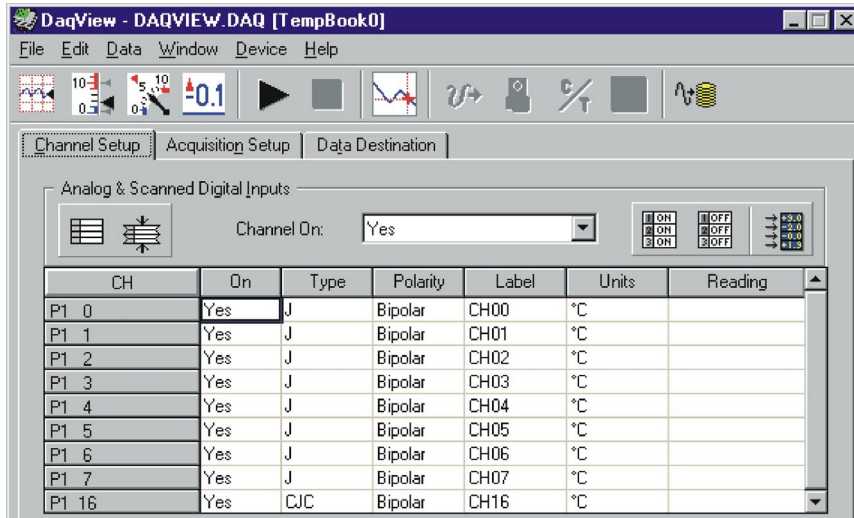


***DaqView Main Window*** (See Note 1)
**Channel Setup Tab Selected**

| # | Item | Description |
|---|------|-------------|
| Main Window, a Brief Description of Button Control Functions | | |
| 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 an independent post-data acquisition program, such as eZ-PostView, if installed. The data acquisition CD includes a PDF version post data acquisition documentation. |
| 8 | Analog Output | Displays the Analog Output window of the available DAC channels (see Note 2 and Note 3). This feature is not used by TempBook. |
| 9 | Digital I/O | Displays the Digital I/O window. This feature is not used by TempBook. |
| 10 | Counter/Timer | Displays the Counter/Timer window. This feature is not used by TempBook. |
| 11 | Waveform & Pattern Output | Displays the Arbitrary Waveform and Streamed Output windows. This feature is not used by TempBook. |
| 12 | Acquire | Activates an acquisition of data to a file. |
| 13 | Show ALL Channels | Expands Analog & Scanned Digital Inputs spreadsheet to show all channels, whether active or not. |
| 14 | Hide INACTIVE Channels | Condenses the Analog & Scanned Digital Inputs spreadsheet, to hide channels that are inactive. |
| 15 | Turn All Visible Channels ON | Turns all visible channels ON. Hidden channels will remain off. |
| 16 | Turn All Channels OFF | Turns all the channels OFF. |
| 17 | Channel Reading | A toggle button that enables [or disables] the Channel Reading column of the Analog and Scanned Digital Input spreadsheet. Some windows require the Channel Reading column to be disabled when changing channels or other parameters. This command is also available from the Data pull-down menu. |

**Note 1**: Although the GUI (graphical user interface) shown is from a DaqBoard/2000 application, it can be used to understand the GUI functionality for other device applications. Items 8, 9, 10, 11 are not used by TempBook.

**Note 2**: Item 8 will only apply to DaqBook/2000 Series devices if a DBK46 card has been installed. If so, 4 DAC analog outputs will be available at the P3 connector on the DaqBook front panel.

**Note 3**: DaqBoard/2000 and /2000c have 2 DACs. DaqBoards /2001, /2001c, /2003, /2003c, /2004, and /2004c each have 4 DACs. No DACs are available on DaqBoard/2002, /2002c, /2005, /2005c.

***DaqView Main Window in a TempBook Application***
***Channel Setup Tab Selected***

As noted in the previous table, and as can be seen in the above figure, when DaqView functions do not apply to a device the non-applicable buttons are grayed-out. TempBook, for example, does not make use of DaqView's Analog Output, Digital I/O, Counter/Timer, or Waveform & Pattern Output functions.
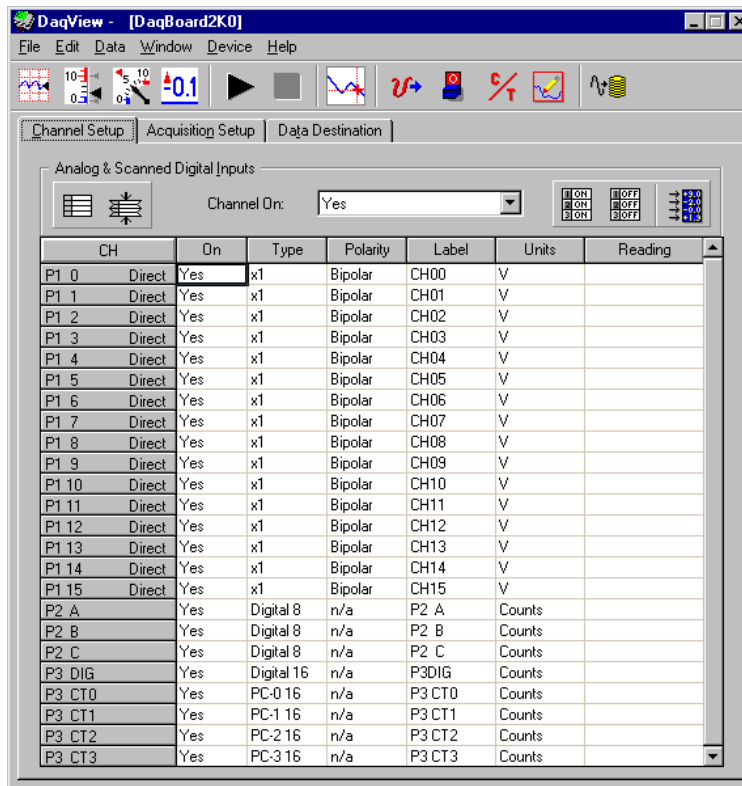
## Functionality Differences amongst DaqBoard/2000 Series and DaqBook/2000 Series

DaqBook/2000A, DaqBook/2000E, and DaqBook/2000X have internal boards with the same acquisition-related functionality as a DaqBoard/2005. However, if a DBK46 option has been installed, the DaqBook/2000 Series device will function in the same manner as a DaqBoard/2001.

Each of the DaqBoard/2000 Series Boards has a different I/O count. DaqBoard/2001 has more I/O than any of the other boards [in the 2000 series]. All other 2000 series boards are essentially derivations of DaqBoard/2001.

The differences in the boards are paralleled in the DaqView software. Basically, if a board does not support a particular function, the related software feature will be disabled (grayed-out). When using any of the information presented in this chapter, always take time to note whether or not it applies to your specific board.

The following screen images represent DaqView Main Windows as they appear for the various devices. A device synopsis is provided just to the right of each screen.

**DaqView - [DaqBoard2K0]**

File  Edit  Data  Window  Device  Help

Channel Setup | Acquisition Setup | Data Destination

Analog & Scanned Digital Inputs

Channel On:  Yes

| CH | | On | Type | Polarity | Label | Units | Reading |
|----|----|----|----|----|----|----|----|
| P1 0 | Direct | Yes | x1 | Bipolar | CH00 | V | |
| P1 1 | Direct | Yes | x1 | Bipolar | CH01 | V | |
| P1 2 | Direct | Yes | x1 | Bipolar | CH02 | V | |
| P1 3 | Direct | Yes | x1 | Bipolar | CH03 | V | |
| P1 4 | Direct | Yes | x1 | Bipolar | CH04 | V | |
| P1 5 | Direct | Yes | x1 | Bipolar | CH05 | V | |
| P1 6 | Direct | Yes | x1 | Bipolar | CH06 | V | |
| P1 7 | Direct | Yes | x1 | Bipolar | CH07 | V | |
| P1 8 | Direct | Yes | x1 | Bipolar | CH08 | V | |
| P1 9 | Direct | Yes | x1 | Bipolar | CH09 | V | |
| P1 10 | Direct | Yes | x1 | Bipolar | CH10 | V | |
| P1 11 | Direct | Yes | x1 | Bipolar | CH11 | V | |
| P1 12 | Direct | Yes | x1 | Bipolar | CH12 | V | |
| P1 13 | Direct | Yes | x1 | Bipolar | CH13 | V | |
| P1 14 | Direct | Yes | x1 | Bipolar | CH14 | V | |
| P1 15 | Direct | Yes | x1 | Bipolar | CH15 | V | |
| P2 A | | Yes | Digital 8 | n/a | P2 A | Counts | |
| P2 B | | Yes | Digital 8 | n/a | P2 B | Counts | |
| P2 C | | Yes | Digital 8 | n/a | P2 C | Counts | |
| P3 DIG | | Yes | Digital 16 | n/a | P3DIG | Counts | |
| P3 CT0 | | Yes | PC-0 16 | n/a | P3 CT0 | Counts | |
| P3 CT1 | | Yes | PC-1 16 | n/a | P3 CT1 | Counts | |
| P3 CT2 | | Yes | PC-2 16 | n/a | P3 CT2 | Counts | |
| P3 CT3 | | Yes | PC-3 16 | n/a | P3 CT3 | Counts | |

*DaqBoard/2000 and DaqBoard/2001 Main Window\**

**\*Also applies to DaqBook/2000 Series Devices when a DBK46 Analog Output option has been installed on the unit's internal board.**

*DaqBoard/2000*
*DaqBoard/2001*
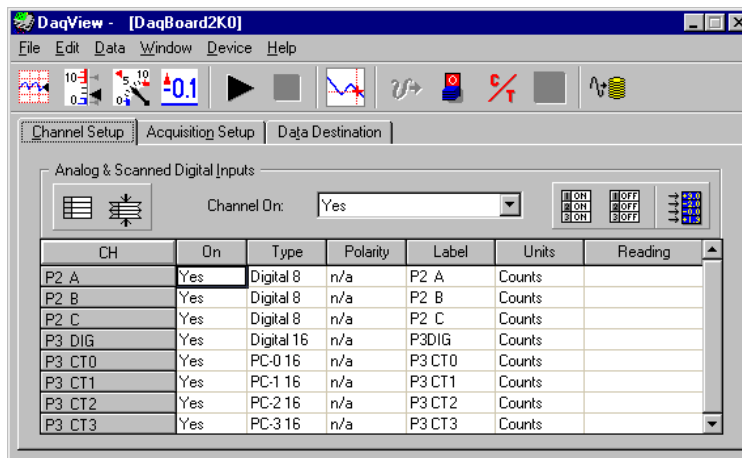*DaqBook/2000 Series* (with DBK46)

These devices have 16 Analog Input Channels, 40 Digital I/O Channels, and 6 Counter/ Timers.

In addition:

DaqBoard/2000 boards have 2 Analog Output Channels.

DaqBoard/2001 boards have 4 Analog Output Channels.

DaqBook/2000 Series devices have 4 Analog Output Channels, providing that a factory-installed DBK46 option is in place on the internal board.

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**DaqView - [DaqBoard2K0]**

File  Edit  Data  Window  Device  Help

Channel Setup | Acquisition Setup | Data Destination

Analog & Scanned Digital Inputs

Channel On:  Yes

| CH | On | Type | Polarity | Label | Units | Reading |
|----|----|----|----|----|----|----|
| P2 A | Yes | Digital 8 | n/a | P2 A | Counts | |
| P2 B | Yes | Digital 8 | n/a | P2 B | Counts | |
| P2 C | Yes | Digital 8 | n/a | P2 C | Counts | |
| P3 DIG | Yes | Digital 16 | n/a | P3DIG | Counts | |
| P3 CT0 | Yes | PC-0 16 | n/a | P3 CT0 | Counts | |
| P3 CT1 | Yes | PC-1 16 | n/a | P3 CT1 | Counts | |
| P3 CT2 | Yes | PC-2 16 | n/a | P3 CT2 | Counts | |
| P3 CT3 | Yes | PC-3 16 | n/a | P3 CT3 | Counts | |

*DaqBoard/2002 Main Window – Channel Setup Tab Selected*

*DaqBoard/2002*

These boards have 40 Digital I/O Channels and 6 Counter/ Timers.

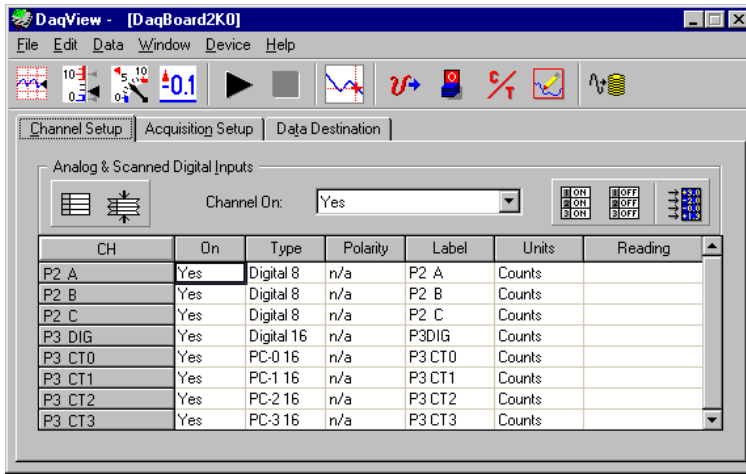These boards have no Analog Channels. Analog-related buttons are grayed-out and P1 (Analog Input) Channels do not appear in the spreadsheet.

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**DaqView - DAQVIEW.DAQ [DaqBoard2K0]**

File  Edit  Data  Window  Device  Help
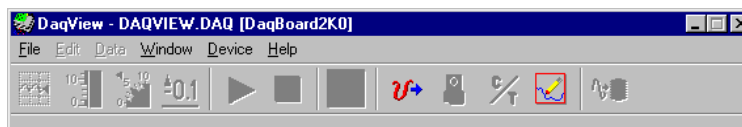
*DaqBoard/2003 Main Window*

*DaqBoard/2003*

DaqBoard/2003 has 4 Analog Output Channels. The main window allows use of four pull-down menus and two toolbar buttons: Analog Output, and Waveform and Pattern Output. Remaining toolbar buttons serve no purpose with this board and are grayed-out. DaqBoard/2003's Main Window has no spreadsheet.
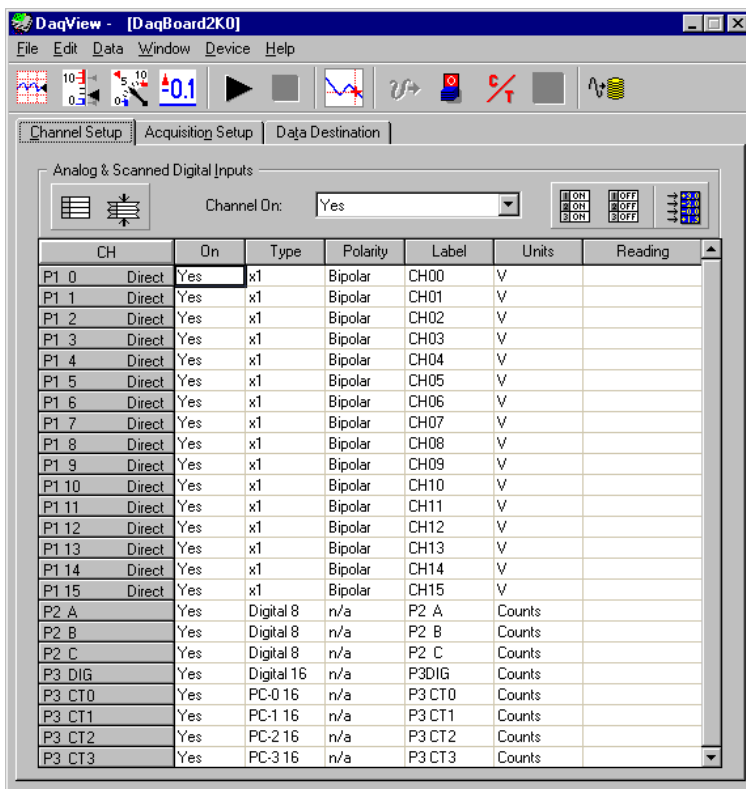
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## DaqBoard/2004

DaqBoard/2004 has 4 Analog Output Channels, 40 Digital I/O Channels, and 6 Counter/ Timers.

The board has no Analog Input Channels, and for that reason no P1 designated channels appear on the spreadsheet portion of the window.

**DaqView - [DaqBoard2K0]**

File  Edit  Data  Window  Device  Help

Channel Setup | Acquisition Setup | Data Destination

Analog & Scanned Digital Inputs

Channel On: Yes

| CH | On | Type | Polarity | Label | Units | Reading |
|---|---|---|---|---|---|---|
| P2 A | Yes | Digital 8 | n/a | P2 A | Counts | |
| P2 B | Yes | Digital 8 | n/a | P2 B | Counts | |
| P2 C | Yes | Digital 8 | n/a | P2 C | Counts | |
| P3 DIG | Yes | Digital 16 | n/a | P3DIG | Counts | |
| P3 CT0 | Yes | PC-0 16 | n/a | P3 CT0 | Counts | |
| P3 CT1 | Yes | PC-1 16 | n/a | P3 CT1 | Counts | |
| P3 CT2 | Yes | PC-2 16 | n/a | P3 CT2 | Counts | |
| P3 CT3 | Yes | PC-3 16 | n/a | P3 CT3 | Counts | |

*DaqBoard/2004 Main Window*

## DaqBoard/2005
## DaqBook/2000 Series (with no DBK46)

DaqBoard/2005 and each member of the DaqBook/2000 Series has 16 Analog Input Channels, 40 Digital I/O Channels, 6 Counter/Timers.

The DaqBoard/2005 and the DaqBook/2000 Series devices have no Analog Output Channels, and for that reason the Waveform and Pattern Output button is grayed-out.

An exception exists for the DaqBook/2000 Series devices, providing that a DBK46 Analog Output option has been installed. In this case 4 DACs will be available.

**DaqView - [DaqBoard2K0]**

File  Edit  Data  Window  Device  Help

Channel Setup | Acquisition Setup | Data Destination

Analog & Scanned Digital Inputs

Channel On: Yes

| CH | | On | Type | Polarity | Label | Units | Reading |
|---|---|---|---|---|---|---|---|
| P1 0 | Direct | Yes | x1 | Bipolar | CH00 | V | |
| P1 1 | Direct | Yes | x1 | Bipolar | CH01 | V | |
| P1 2 | Direct | Yes | x1 | Bipolar | CH02 | V | |
| P1 3 | Direct | Yes | x1 | Bipolar | CH03 | V | |
| P1 4 | Direct | Yes | x1 | Bipolar | CH04 | V | |
| P1 5 | Direct | Yes | x1 | Bipolar | CH05 | V | |
| P1 6 | Direct | Yes | x1 | Bipolar | CH06 | V | |
| P1 7 | Direct | Yes | x1 | Bipolar | CH07 | V | |
| P1 8 | Direct | Yes | x1 | Bipolar | CH08 | V | |
| P1 9 | Direct | Yes | x1 | Bipolar | CH09 | V | |
| P1 10 | Direct | Yes | x1 | Bipolar | CH10 | V | |
| P1 11 | Direct | Yes | x1 | Bipolar | CH11 | V | |
| P1 12 | Direct | Yes | x1 | Bipolar | CH12 | V | |
| P1 13 | Direct | Yes | x1 | Bipolar | CH13 | V | |
| P1 14 | Direct | Yes | x1 | Bipolar | CH14 | V | |
| P1 15 | Direct | Yes | x1 | Bipolar | CH15 | V | |
| P2 A | | Yes | Digital 8 | n/a | P2 A | Counts | |
| P2 B | | Yes | Digital 8 | n/a | P2 B | Counts | |
| P2 C | | Yes | Digital 8 | n/a | P2 C | Counts | |
| P3 DIG | | Yes | Digital 16 | n/a | P3DIG | Counts | |
| P3 CT0 | | Yes | PC-0 16 | n/a | P3 CT0 | Counts | |
| P3 CT1 | | Yes | PC-1 16 | n/a | P3 CT1 | Counts | |
| P3 CT2 | | Yes | PC-2 16 | n/a | P3 CT2 | Counts | |
| P3 CT3 | | Yes | PC-3 16 | n/a | P3 CT3 | Counts | |

*DaqBoard/2005 Main Window\**

**\*Also applies to DaqBook/2000 Series Devices when no DBK46 Analog Output option is installed on the unit's internal board.**

## A DaqView Walk-Through

The following walk-through is intended to familiarize you quickly with the DaqView data acquisition program.   The walk-through does not apply to DaqBoard/2003, as that board makes minimal use of DaqView.  DaqBoard/2003 users can, however, go through the following steps with the simulated instrument.

(1) Open DaqView.  If your Daq device or DBK signal-conditioning units are not connected you can select *Simulated Instrument* as your device.
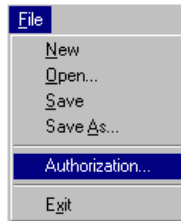
(2) From DaqView's **File** menu, select **Authorization.**
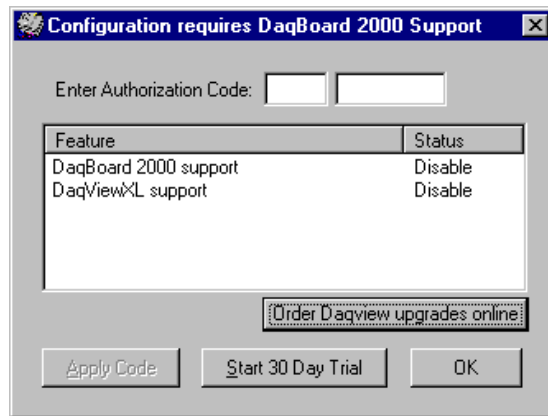
**Note**:  Step 3 does not apply to DaqBook/2000A, DaqBook/2000E, or DaqBook/2000X.

(3) If you ordered DaqView, 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 DaqView.  Note that you can also order DaqView upgrades "online."
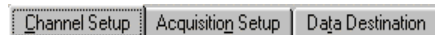
(4) To familiarize yourself with the three windows available from DaqView's main window, click the tabs **Channel Setup**, **Acquisition Setup**, and **Data Destination**.  These are not available for DaqBoard/2003.
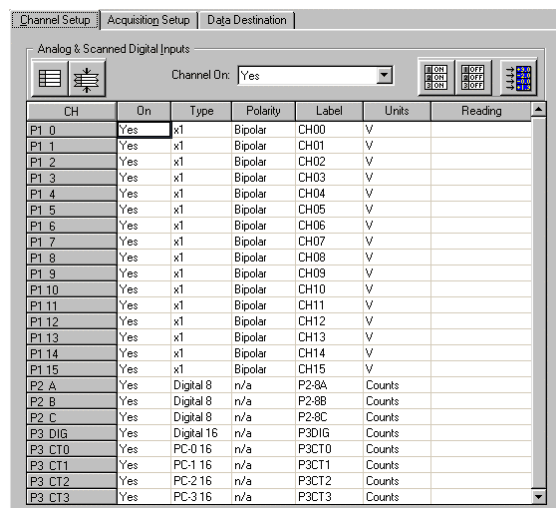
**Channel Setup** displays a spreadsheet for viewing and changing the configuration of analog and scanned digital input channels. Each row is dedicated to a single channel.

*Since each DaqBoard/2000 Series board has different enabled functions, your board's actual screen shots may appear slightly different than shown in the example screen shots.*

*For the most part, the following screen images will relate closely to DaqBook/2000 Series devices. Exceptions will be noted, when applicable.*
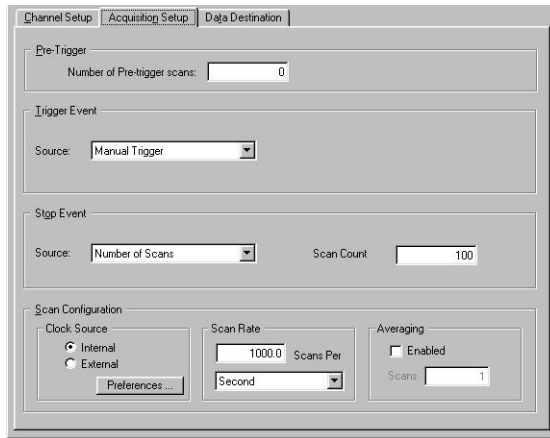
**Acquisition Setup** displays a window that includes parameters for triggering and configuring the scan. These settings are used when an acquisition to disk is started with the toolbar's **Acquire** button. When the trigger is satisfied, scans are collected at the selected scan frequency and stored to disk in the designated file. Note that these parameters cannot be altered while an acquisition is in progress.
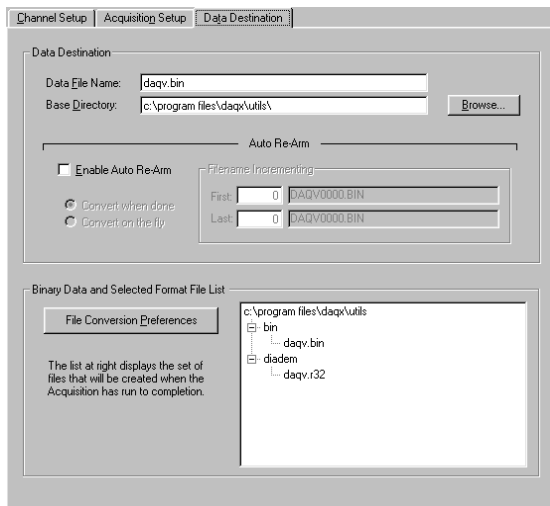
**Data Destination** provides a means of designating the desired file formats and directories for acquired data.
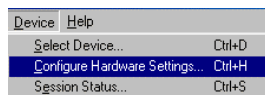
From DaqView's **Device** menu, select **Configure Hardware Settings**.

The window **Configure System Hardware** will appear. Whenever expansion cards are added, you must update this window.

On the left side of the window, select any channel's pull-down box to reveal the external connection options. Besides the default, direct signal connection, you can choose among the DBK option cards and modules. The right side of the screen sets up digital connections if your Daq device is so equipped.

User's of certain DBK cards will need to select an internal clock speed of 100 kHz as discussed in the following section.

Click **OK** to return to DaqView's main window.
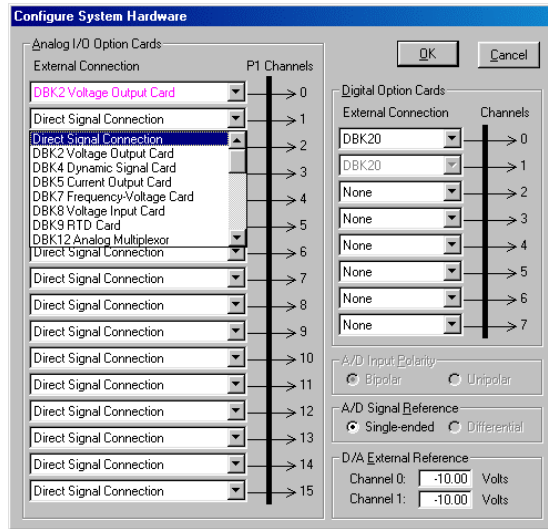
*Configure System Hardware*

**Screen Sample for DaqBoard/2000, /2001, /2005 and for DaqBook/2000 Series Devices.**
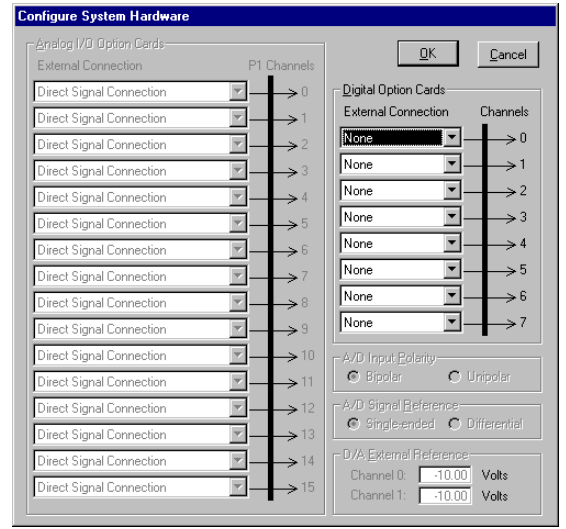


*Configure System Hardware*

**Screen Sample for DaqBoard/2002 and /2004.**

DaqBoard/2002 and DaqBoard 2004 have no Analog Input, thus the Analog I/O Option Cards sections of the screen are *grayed-out*.

**The information in this block only applies to DaqBook/2000 Series Devices and to DaqBoard/2000, /2001, and /2005.**

Note!

**Selecting 100 kHz Internal Clock Speed**

**User's of DBK12, DBK13, DBK15, DBK19, DBK52, DBK53, or DBK54 need to select 100 kHz internal clock speed as discussed below.**
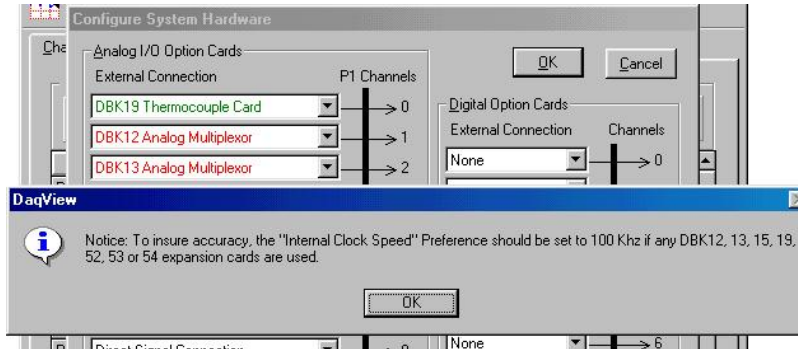
In the *Configure Systems Hardware* window, after selecting DBK12, DBK13, DBK15, DBK19, DBK52, DBK53, or DBK54 you will need to select an internal clock speed of 100 kHz.
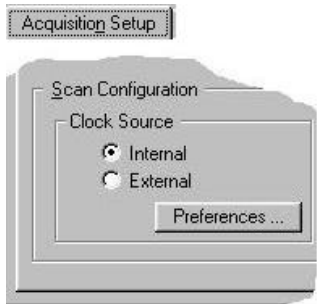
To select an "Internal Clock Speed" of 100 kHz:

(1)  Select the *Acquisition Setup* tab on DaqView's main window.

(2)  On the lower left corner of the window, under *Scan Configuration*, click the **Preferences** button.

The *Advanced Options* window will appear (following figure).

**Note**: The *Advanced Options* box can also be accessed from the Windows pull-down menu.
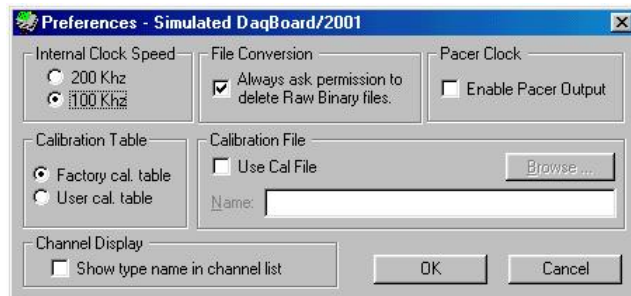
(3)  Under "Internal Clock Speed," select **100 kHz**.

(4)  Click the OK button to return to DaqView's main window.

This completes the clock setting procedure.

*Continuing with the "Tour of DaqView"…*

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 an independent post-data acquisition program, such as eZ-PostView. For details, refer to the eZ-PostView PDF document that is included on your data acquisition CD. You can access the document via the <View PDFs> button located on your CD's intro-screen.

# Channel Setup

The Channel Setup window (first tab on lower portion of main window) 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 | Yes | x1 | Bipolar | CH00 | V | |
| P1 1 | Yes | x1 | Bipolar | CH01 | V | |
| P1 2 | Yes | x1 | Bipolar | CH02 | V | |
| P1 3 | Yes | x1 | Bipolar | CH03 | V | |
| P1 4 | Yes | x1 | Bipolar | CH04 | V | |
| P1 5 | Yes | x1 | Bipolar | CH05 | V | |
| P1 6 | Yes | x1 | Bipolar | CH06 | V | |
| P1 7 | Yes | x1 | Bipolar | CH07 | V | |
| P1 8 | Yes | x1 | Bipolar | CH08 | V | |
| P1 9 | Yes | x1 | Bipolar | CH09 | V | |
| P1 10 | Yes | x1 | Bipolar | CH10 | V | |
| P1 11 | Yes | x1 | Bipolar | CH11 | V | |
| P1 12 | Yes | x1 | Bipolar | CH12 | V | |
| P1 13 | Yes | x1 | Bipolar | CH13 | V | |
| P1 14 | Yes | x1 | Bipolar | CH14 | V | |
| P1 15 | Yes | x1 | Bipolar | CH15 | V | |
| P2 A | Yes | Digital 8 | n/a | P2-8A | Counts | |
| P2 B | Yes | Digital 8 | n/a | P2-8B | Counts | |
| P2 C | Yes | Digital 8 | n/a | P2-8C | Counts | |
| P3 DIG | Yes | Digital 16 | n/a | P3DIG | Counts | |
| P3 CT0 | Yes | PC-0 16 | n/a | P3CT0 | Counts | |
| P3 CT1 | Yes | PC-1 16 | n/a | P3CT1 | Counts | |
| P3 CT2 | Yes | PC-2 16 | n/a | P3CT2 | Counts | |
| P3 CT3 | Yes | PC-3 16 | n/a | P3CT3 | Counts | |

*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 for each channel. The gains and types will vary among the option cards. A block of cells in this column can be selected for multiple channels with the same type of option card. Double-clicking a cell will select the next available gain or type.<br><br>**Note**: If one of the P3 counters is active in the scan, and Type is selected for frequency measurement, low frequency input signals will require a slow scan rate setting for accurate measurement. For example, for a frequency of 200 Hz, set the Scan Rate (in the Acquisition Setup window) for 1 scan per second or 6 scans per minute. |
| **Polarity** | This column shows the channel polarity (unipolar or bipolar) for each channel. The polarity can be programmed here on a per channel basis when using a DaqBook/200, /216, /260 and any DaqBoard [ISA or PCI type], or a DBK15 Universal Current/Voltage expansion card. When using any other Daq*s, this column is set in the Hardware Setup window. 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 the hardware cannot program the polarity, 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** | This column allows you to change the engineering units of each channel and apply a linear equation to the Daq data. When a cell or block of cells in this column is selected, the analog input box displays entry options in a pull-down box. Selecting "mx+b" allows you to define $m$ and $b$ and the engineering units label. The engineering units will then be displayed in the "Units" column and the "mx+b" equation will be applied to the reading from the Daq before the reading is displayed or written to disk. The $X$ in this equation is the voltage read back from the Daq (or degrees Celsius for a DBK19). For example, if a Daq channel is configured as bipolar and unity (×1) gain, the default voltage would be ±5 V. This corresponds to an $m$ of 1, a $b$ of 0, and a unit of $V$. $V$ can be changed to millivolts by setting $m$ to 1000 and units to $mV$. The Units column can also be used to perform a software calibration of the Daq. This is done by reading known inputs at two different points of the input voltage range (usually at 0 and full-scale) and solving the equation $y = mx + b$. The full-scale voltage, which changes according to the gain of the channel, is 5 V/gain for bipolar channels and 10 V/gain for unipolar channels. |
| **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. |

# *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.
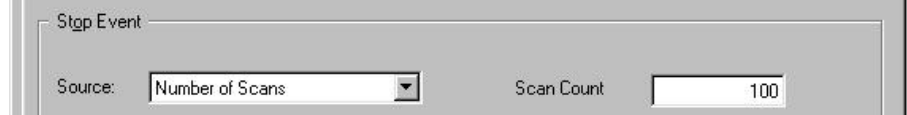


*Acquisition Tab Selected*
Note: Clock Divider appears only when SyncSlave is selected.

| Acquisition Setup Window | |
|---|---|
| **Parameter** | **Description** |
| **Pre-Trigger** | The number of scans to acquire before the trigger event. |
| **Trigger Event** | Selects the trigger source, depending on the device. Possible trigger sources include: <br><br> *Immediately* – arms and executes the trigger immediately. <br> *Key Hit* – arms the acquisition and waits for the user to press a key. <br> *External TTL Rising/Falling* – waits for a rising or falling edge slope on P1-25. <br> *Hardware Rising/Falling Edge* – monitors value with hysteresis on selected channel; triggers when parameter is satisfied. |
| These 6 triggers apply only to DaqBoard/2000 Series Boards and to DaqBook/2000 Series Devices. | *External TTL High/Low* – waits for a TTL high or low level on pin 25 of connector P1. <br> *Hardware Above/Below Level* – monitors value on selected channel; triggers when parameter is satisfied. <br> *Above/Below Level* – monitors value on selected channel; triggers when parameter is satisfied. <br> *Rising/Falling Edge* – monitors value with hysteresis on selected channel; triggers when parameter is satisfied. <br> *Inside/Outside Window* – monitors upper and lower values on selected channel; triggers when parameters are satisfied. <br> *Digital Pattern* – monitors 8-bit pattern on selected digital input channel; triggers when parameters (less/greater than or equal to/not equal to) are satisfied. |

**Stop Event**



The Stop Event panel is used to select the event that stops the scanning, depending on the device connected. Possible sources include:

*Number of Scans* - 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.

*Key Hit* – stops acquisition when the user presses a key.

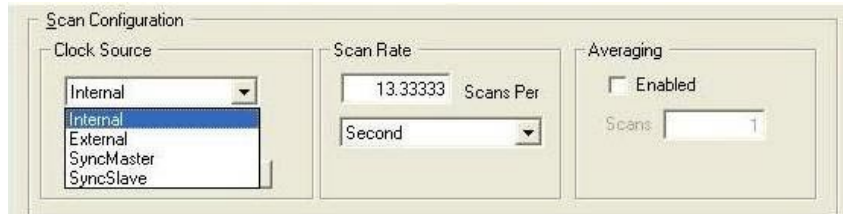These 4 Stop Events apply only to DaqBoard/2000 Series Boards and to DaqBook/2000 Series Devices.

*Above/Below Level* – monitors value on selected channel; stops scan when parameter is satisfied.

*Rising/Falling Edge* – monitors value with hysteresis on the selected channel; stops the scan when the parameter is satisfied.

*Inside/Outside Window* – monitors upper and lower values on selected channel; stops scan when parameters are satisfied.

*Digital Pattern* – monitors 8-bit pattern on selected digital input channel; stops scan when parameters (less/greater than or equal to/not equal to) are satisfied.

**Scan Configuration**



**Clock Source**
*Drop-down list*

Provides a means of choosing one of the following options:

<u>Internal</u> – selects the device's internal clock

<u>External</u> – selects an external user-supplied clock

<u>SyncMaster</u> – Sets the device as the Master and selects the internal pacer clock. (DaqBook/2000 Series Only)

<u>SyncSlave</u> – Sets the device as a Slave unit and uses the clock of a Master device to which it is connected. In addition, when SyncSlave is selected a Clock Divider box appears (right-side figure). The value of the divider can be set from 1 to 65535. This sets the scan rate to a fraction of the Master rate. The fastest rate is set by using a value of "1." A setting of "10" would result in a scan once every tenth clock pulse. The slowest possible setting is "65535." (DaqBook/2000 Series Only)



*Clock Divider*

The Clock Divider only appears when SyncSlave is selected from the drop-down list.

| | |
|---|---|
| **Clock Source <Preferences> Button** | The **Preferences** button brings up a Preferences box (following figure), which provides a means of selecting and/or adjusting the following options:<br><br>__Internal Clock Speed__ - For DaqBoard/2000 series boards, the default setting is 200 kHz. Note that the use of certain DBK cards requires a setting of 100 kHz, as discussed elsewhere in this manual. (For DaqBook/2000 Series & DaqBoard/2000 Series Only).<br><br>__Pacer Clock__ – Enable or disable a pacer clock. (For DaqBook/2000 Series & DaqBoard/2000 Series Only).<br><br>__File Conversion__ – Enable or disable a "delete Raw Binary files" notice.<br><br>__Calibration Table__ – Select Factory or User calibration table. (For DaqBook/2000 Series & DaqBoard/2000 Series Only).<br><br>__Calibration File__ – 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.<br><br>__Zero Offset Adjustment__ –Protects against drift<br><br>__Channel Display__ –Enables the expansion option type in the channel list. |
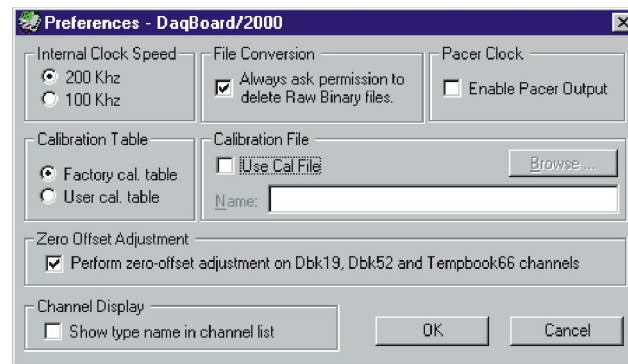


*Preferences Box*

The following sections of the "Preferences" box apply only to the DaqBoard/2000 Series Boards and to DaqBook/2000 Series Devices:

- Internal Clock Speed
- Pacer Clock
- Calibration Table

Zero Offset Adjustment applies only to DBK19, DBK52, and TempBook

| | |
|---|---|
| **Scan Rate** | 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. |
| **Averaging** | 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. |

**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.
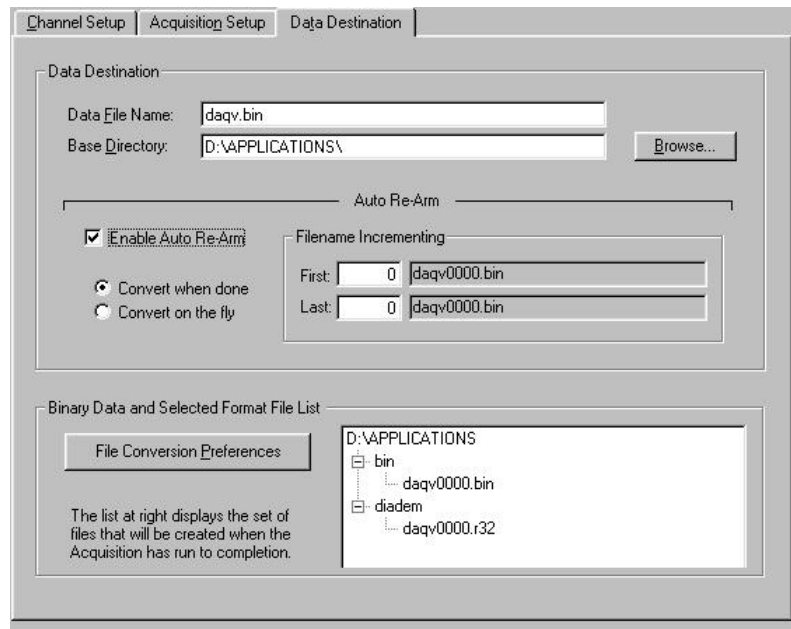


*Data Destination Tab Selected*

| 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 | This button lets you select the format of saved data. Selections include: DIAdem, ASCII text, DADiSP, DASYLab, MATLAB, PostView Binary, Snap-Master Binary, .Wav, and UFF (Universal File Format). The tree shows where the various formatted files will be saved on disk. |
| | 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. |

# *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.

## **F**ile

| 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. |
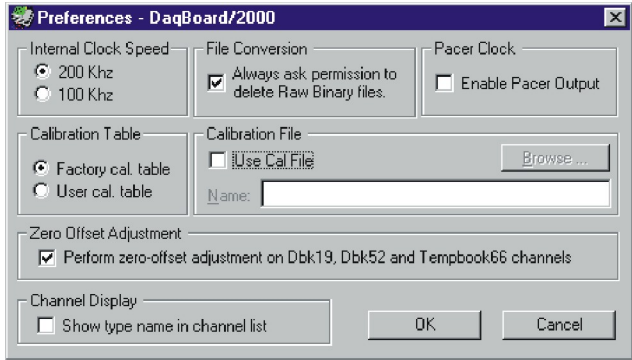
## **E**dit

| 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. |
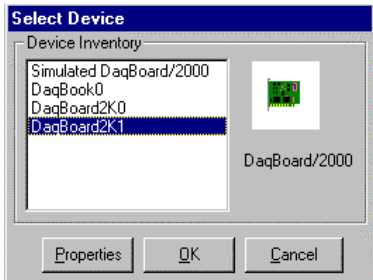
## **D**ata

| 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 the post acquisition data analysis application. |
| Analog Output | Displays the analog output window.    Does not apply to TempBook. |
| Digital I/O | Displays the digital I/O window.        Does not apply to TempBook. |
| Counter/Timer | Displays the counter/timer window.    Does not apply to TempBook. |
| Waveform & Pattern Output | Displays the arbitrary waveform and streamed output windows.    Does not apply to TempBook. |
| Preferences | Displays a preferences box that shows user-selectable options the particular Device model may have. For example, with a DaqBoard/2001, the following preferences can be set.<br><br><br><br>**Note**: DaqBoard/2000 Series and DaqBook/2000 Series devices can have their internal clock speed set to 200 kHz (default) or 100 kHz. However, the use of certain DBK cards requires a setting of 100 kHz, as discussed elsewhere in this document.<br><br>The Pacer Clock checkbox lets you enable a clock output. |

## Device

| Device Menu Items and Descriptions | |
|---|---|
| **Select Device** | Provides a means to select an actual connected device, or a simulated instrument.<br><br> |

| | |
|---|---|
| **Configure Hardware Settings** | Opens the Configure System Hardware window that lets you tell the software how the hardware is set up. Setup sections include: Analog I/O Option Cards (DBKs), Digital Option Cards, A/D Input Polarity, A/D Signal Reference, and D/A External Reference.<br><br>Options that do not apply to a particular device will be *grayed-out* when applicable.<br><br><br><br>*Configure System Hardware*<br><br>The Analog I/O Option Cards section lets you assign DBK expansion cards to the 16 analog input channels. If no expansion cards are added, leave the default value (Direct Signal Connection) on all 16 channels. As expansion cards are added, this window must be updated.<br>Selecting a DBK expansion board will add channels in the main window's Analog & Scanned Digital Inputs spreadsheet. Channels associated with DBK expansion boards will also have their own gains or modes to choose from in the analog input spreadsheet. If needed, a dialog box will appear and allow you to set sub-channel addresses or other parameters.<br>If using the DaqBook/100, DaqBook/112 orDaqBook/120, set the radio buttons for *Single-Ended* or *Differential* and *Bipolar* or *Unipolar* to match the settings of the corresponding hardware jumpers (the default hardware settings are *Single-Ended* and *Bipolar)*. When *Differential* is selected, only 8 analog inputs are available. When analog expansion boards are connected, set the Daq for *Single-Ended*.<br>If using the DaqBook/100, DaqBook/200, DaqBook/260, DaqBoard/100A, DaqBoard/200A, a DaqBoard/2000 Series or a DaqBook/2000 Series device, the Digital Option Cards section lets you configure the digital I/O hardware. If no DBK20 digital expansion boards are connected, three 8-bit I/O ports are accessible from the main window. Six additional 8-bit ports are made available in the main window for each DBK20 added.<br>Make sure this window is kept updated for the actual hardware used.<br><br>**User's of DBK12, DBK13, DBK15, DBK19, DBK52, DBK53, or DBK54 need to select 100 kHz internal clock speed as discussed on page 10 of this document module.** |
| **Session Status** | Displays the currently selected device, its alias, and whether DaqView can recognize it. |

## Help

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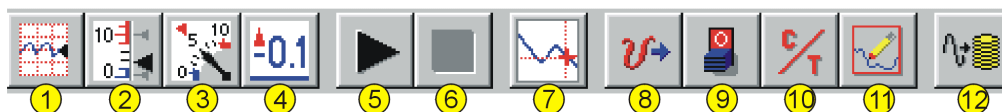*About* provides the current software version number.

**Notes**

# *Toolbar Items*

## Main Window Buttons

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 to a particular board, the toolbar button will be grayed-out. The beginning of this chapter includes toolbar screen shots for each of the DaqBoard/2000 Series boards.



| 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 an independent post-data acquisition program, such as eZ-PostView, if installed. The data acquisition CD includes a PDF version post data acquisition documentation. |
| 8 | Analog Output | Displays the Analog Output window of the available DAC channels (see Note 2 and Note 3). This feature is not used by TempBook. |
| 9 | Digital I/O | Displays the Digital I/O window. Does not apply to TempBook. |
| 10 | Counter/Timer | Displays the Counter/Timer window. Does not apply to TempBook. |
| 11 | Waveform & Pattern Output | Displays the Arbitrary Waveform and Streamed Output windows. Does not apply to TempBook. |
| 12 | Acquire | Activates an acquisition of data to a file. |

**Note 1**: Items 8, 9, 10, 11 are not used by TempBook.

**Note 2**: Item 8 will only apply to a DaqBook/2000 Series device if a DBK46 card has been installed. If so, 4 DAC analog outputs will be available at the P3 connector on the unit's front panel.

**Note 3**: DaqBoard/2000 and /2000c have 2 DACs. DaqBoards /2001, /2001c, /2003, /2003c, /2004, and /2004c each have 4 DACs. No DACs are available on DaqBoard/2002, /2002c, /2005, /2005c.

## Channel Setup Buttons



### *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.
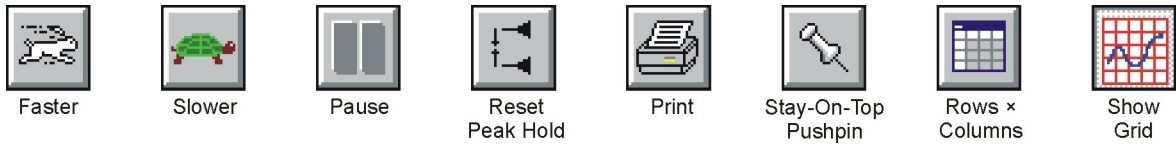


### *Channel Readings*

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.

## Charts and Meters Buttons

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 × Columns | Show Grid |
|--------|--------|-------|------------------|-------|----------------------|----------------|-----------|

## Button Display Windows

### Charts

This toolbar item 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.
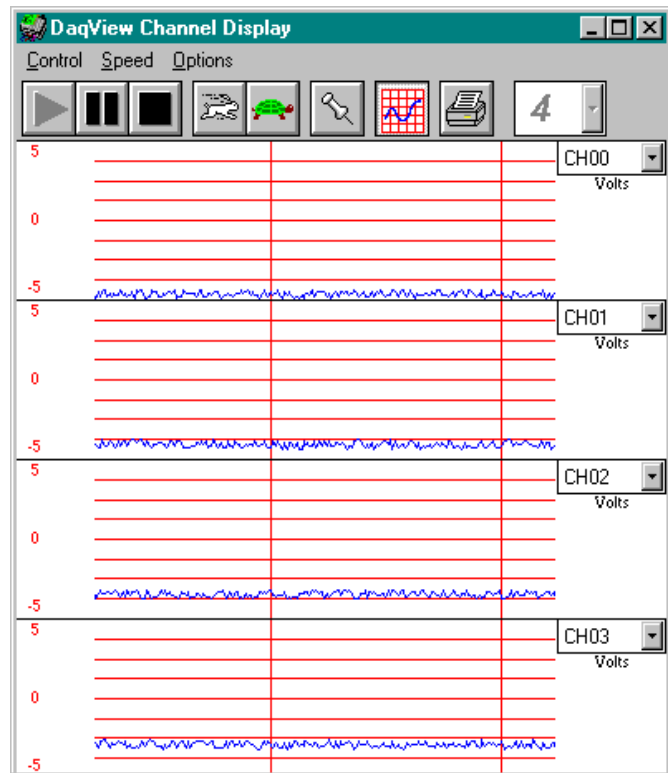
*DaqView Display Charts*

### 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.
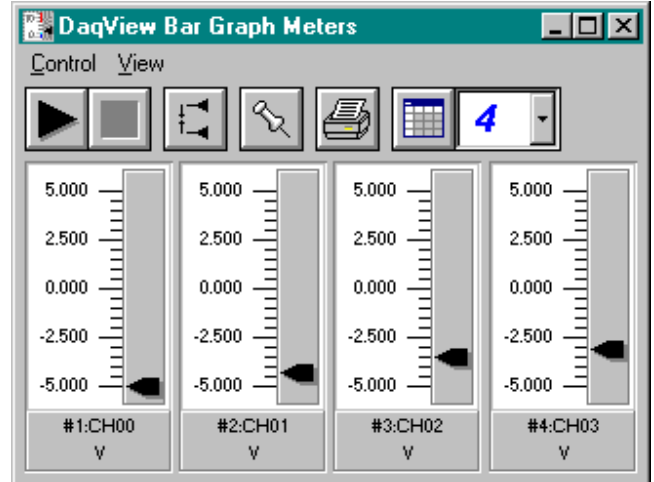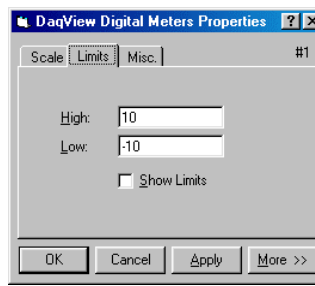
*Bar Graph Window*

### 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.
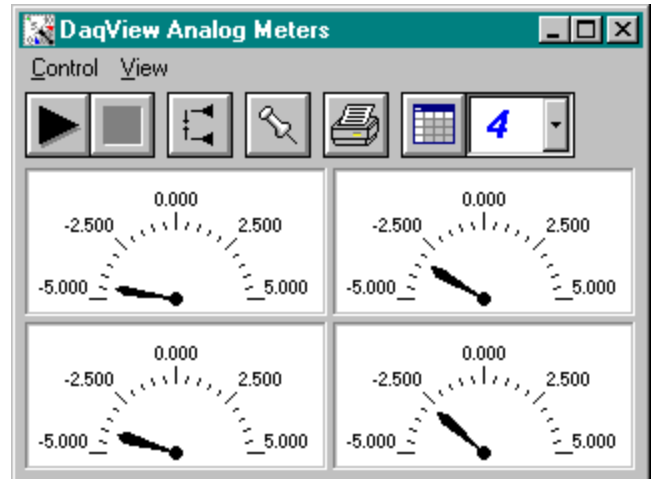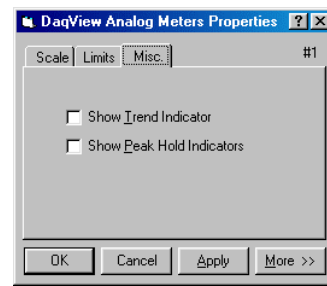
*Analog Meters Window*

### 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.
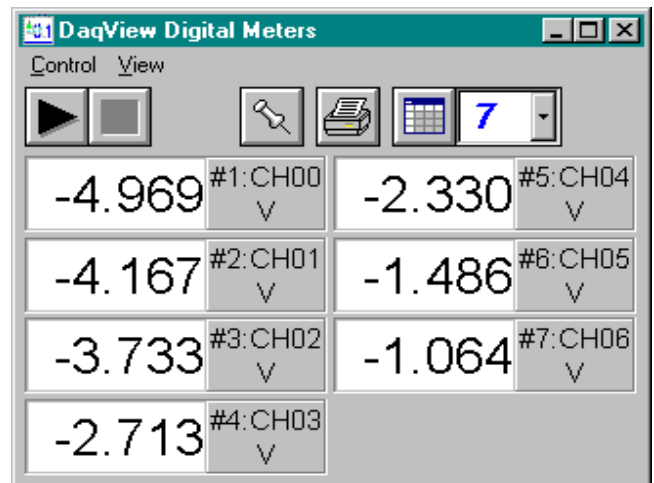
*Digital Meters Window*

### Properties of Meter Windows
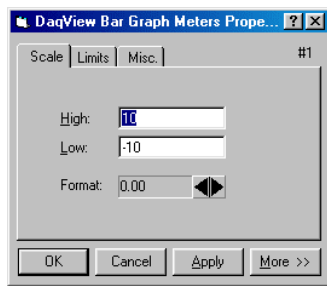


**Bar Graph Meters Properties**
Scale Tab Selected

**Digital Meters Properties**
Limits Tab Selected

**Analog Meters Properties**
Miscellaneous Tab Selected

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.

### Start (or Stop) All Indicators

These buttons use the same icons as many CD players (right-pointing triangle for start; square for stop). To change some parameters, you may have to stop the data display. The Start and Stop All Indicators buttons affect several windows if open, including: Reading column, Charts, Bar Graph Meters, Analog Meters, and Digital Meters.

**Note**: You can start or stop any of these active windows separately using their own Start, Stop (or Pause) buttons.

### Analog Output Window

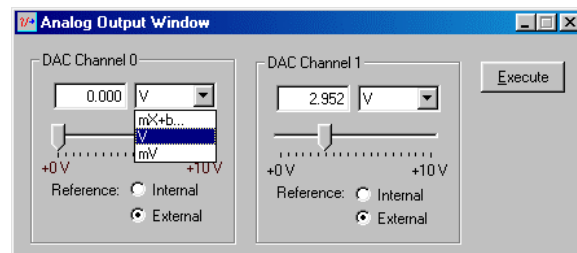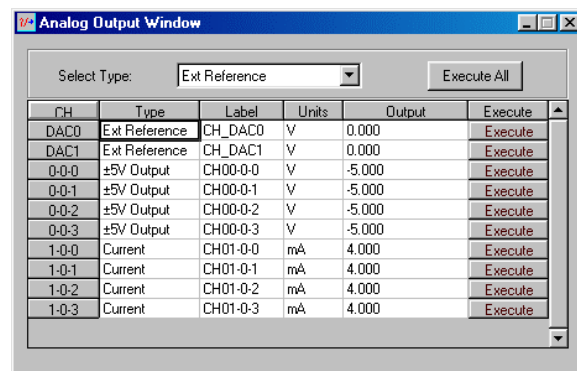**Note: This feature is not used by TempBook.**

The analog output window provides interactive access to the analog outputs on the DaqBoard/2000, /2001, /2003, /2004, DaqBoard/2000c, /2001c, /2003c, and /2004c. If a DBK46 is installed in a DaqBook/2000 Series device, access to 4 DACs (DAC0, DAC1, DAC2, and DAC3) is available. 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.

Two versions of this window exist. If a DBK2 or DBK5 (see Note 1) is active in the Analog & Scanned Digital Input spreadsheet, the window will accommodate voltage and current output in addition to the DAC reference.



*Analog Output Window* (with and without DBK2 & DBK5)

**Note 1**: DBK2 and DBK5 cannot be used with DaqBoard/2002, /2003, or /2004.

**Note 2**: This window is not available when the arbitrary waveform window is visible.
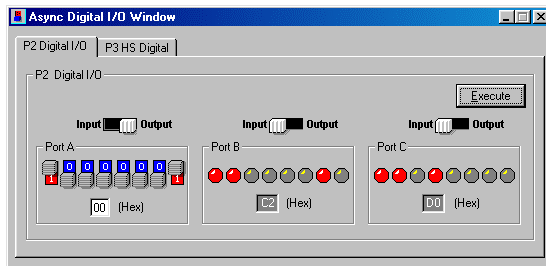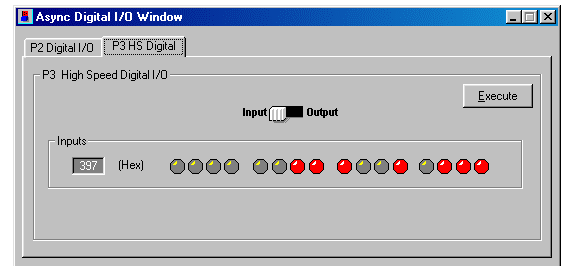
### *Digital I/O Windows*

**The Digital I/O Windows apply to:**
    **DaqBook/100, /200, /260**
    **DaqBoard/100A, /200A**
    **DaqBoard/2000, /2001, /2002, and /2004**
    **DaqBook/2000 Series Devices**

**Note:  This feature is not used by TempBook.**



*Asynchronous Digital I/O Window –*
P2 Digital I/O Tab Selected



*Asynchronous Digital I/O Window –*
P3 HS (High Speed) Digital I/O Tab Selected

The digital I/O windows are displayed when the Digital I/O button on the main window is selected. These windows provide 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. If high-speed digital I/O is supported (on connector P3), a second window is available for configuring inputs and 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*

**Note:  This feature is not used by TempBook.**

**The Counter/Timer function is used by DaqBoard/2000 Series Boards (except /2003).**
**The Counter/Timer function is also used by the DaqBook/2000 Series Devices.**

Two Counter/Timer modes are available.

- **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.
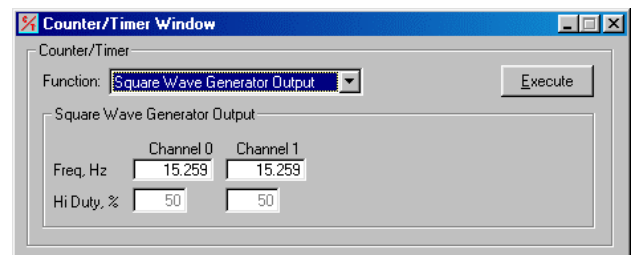


**Note**:  When using DaqBoard/2000 Series or DaqBook/2000 Series devices, channels that are enabled in the scan cannot be used from the asynchronous counter/timer window.

- **To use this feature with DaqBook/2000 Series Devices, a DBK46 Analog Output card must be installed on the unit's internal board.**

- **This window can not be used with DaqBoard/2002 or DaqBoard/2005, as these two boards have no DACs.**

- **This feature is not used by TempBook.**

Within DaqView there exists a waveform mode for devices that have analog output channels. DaqView allows the associated DaqBoard/2000 Series DACs to be configured in interactive mode or waveform mode. This also applies to DaqBook/2000 Series devices, providing an optional DBK46 Analog Output card is installed on the unit's internal board.

The window has two tabs: *Analog Waveform* and *Streaming Output*.

- 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.

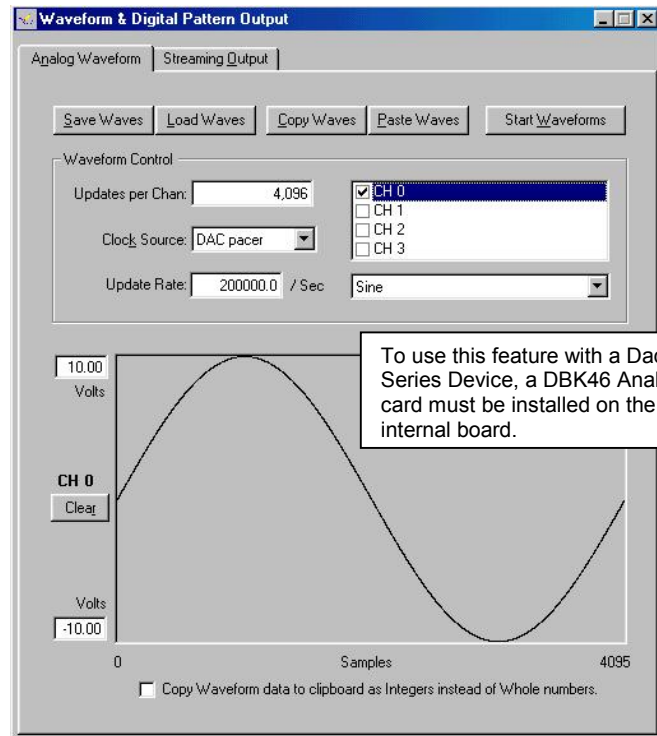*Waveform and Digital Pattern Output Window – Analog Waveform Tab Selected*

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 DaqBoard/2000, having two DACs allows for two channels to be selected. DaqBoard/2001, 2003, and /2004 have four DACs and allow for up to 4 DAC analog output channels to be selected. DaqBook/2000 Series devices, that have a DBK46 Analog Output card installed, have 4 DAC analog output channels. A DaqBook/2000 Series device without a DBK46 has no analog output.

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.

**Note**:  To use this feature with a DaqBook/2000 Series Device, a DBK46 Analog Output card must be installed on the unit's internal board.

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.
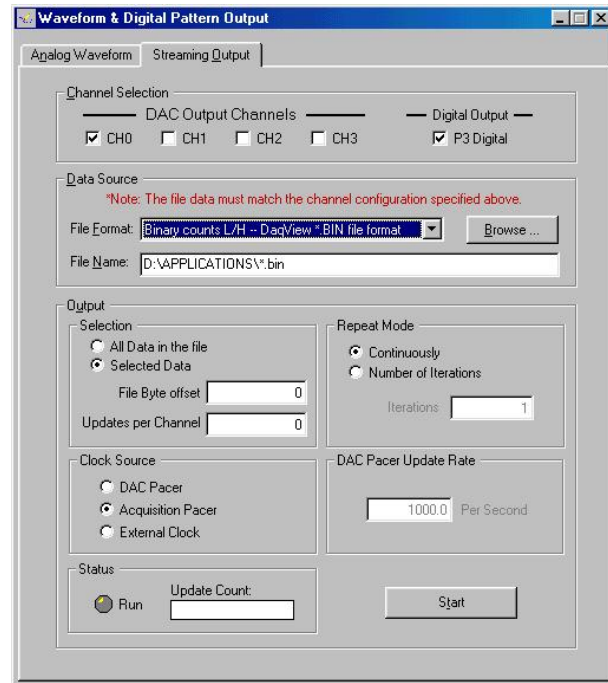


### Acquire

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 as a 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

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.
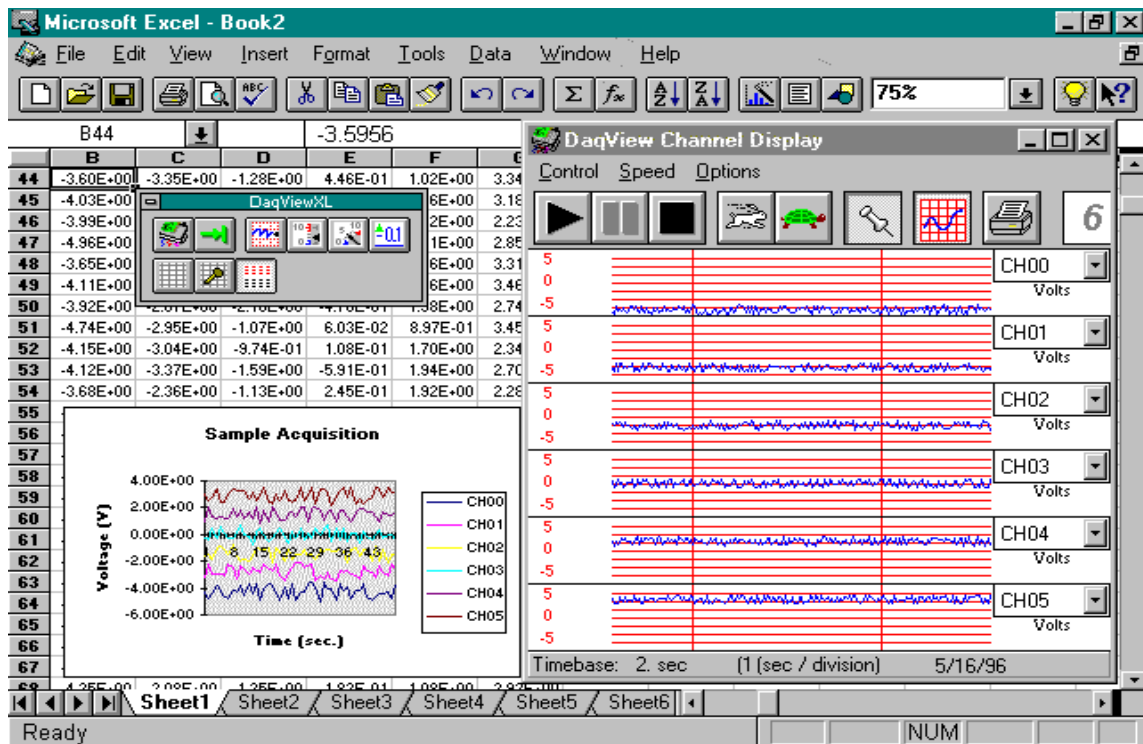


*DaqViewXL Toolbar and Displays*

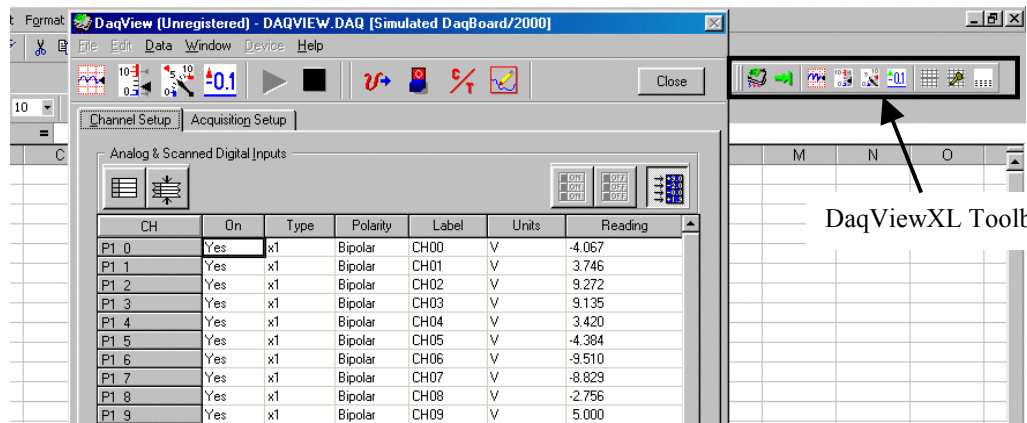## Configuring an Acquisition

To launch DaqViewXL's main screen:

1. If you have not already done so, install DaqViewXL.
2. Enter Excel.
3. Click the *Configure...* icon (the first one in the DaqViewXL toolbar).

Configure →

Jason: Shouldn't we identify the icons ?

***DaqViewXL Toolbar***

This launches DaqViewXL's main screen (see following figure). Note that DaqViewXL does not have a <View File Data> button, since data is viewed in the Excel spreadsheet. The earlier discussion of DaqView configuration still applies.

DaqViewXL Toolbar

***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.
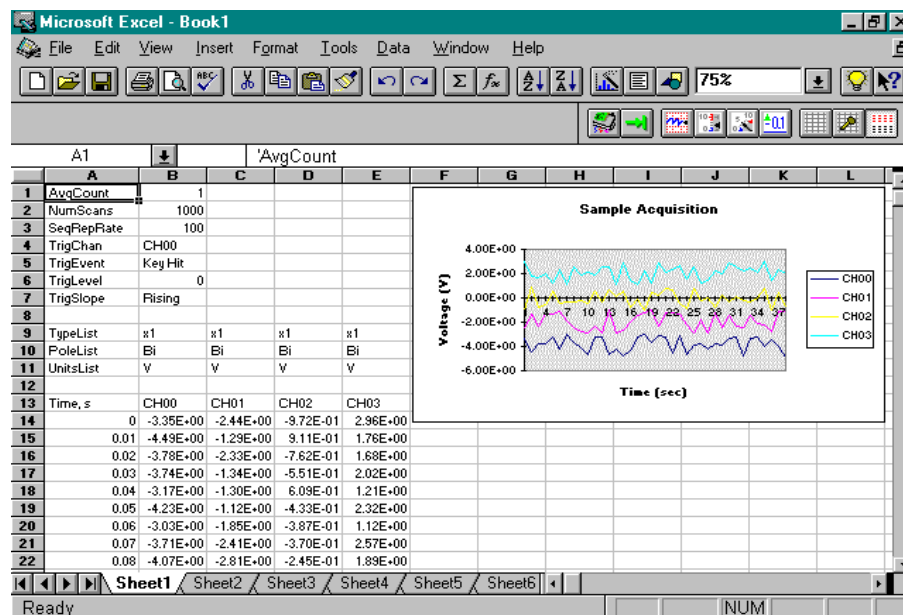
***DaqViewXL Data Header***

# 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.