

# Using IOtech Data Acquisition Products with **DASYLab**<sup>®</sup>

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## Using IOtech Data Acquisition Products with **DASYLab**

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## **About this Document**

This document serves as a supplement to both your *DASYLab* and specific data acquisition device user's manuals. It is intended to help you with your initial setup of IOtech data acquisition hardware in *DASYLab*.

The document steps through software installation configuration issues and provides screen shots so you can more easily setup and use your equipment.

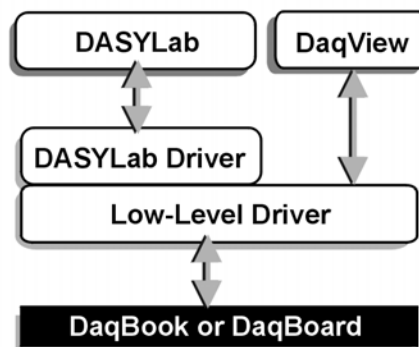
Since the document covers several different types of hardware, for example, DaqBoard/2000 Series devices, DaqBook/2000 Series devices, WaveBooks, and DynaRes units; look over the table of contents and refer only to the section(s) that apply to your applications.

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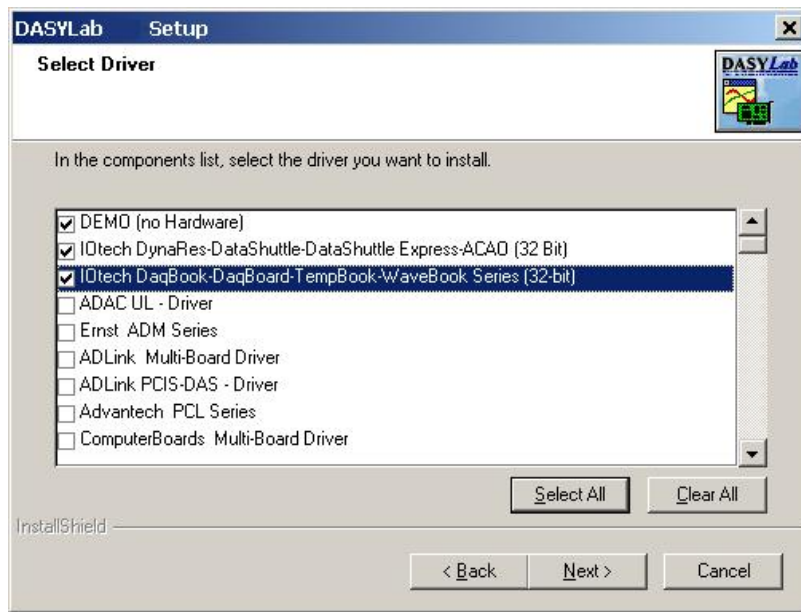


*Software Support Structure*

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## Install DASyLab

1. Launch *DASyLab* installation from the **DASyLab CD**. Note that the CD should *auto-start*. If the CD does not auto-start, run the CD **start.exe** from the Windows Desktop.
2. Select "Installation," then "Full Version." The actual installation process begins.
3. When prompted for your *name, company* and *serial number*, enter the requested data. Obtain the serial number from the CD jacket. Keep the number in a safe place for future installations and upgrades.
4. When prompted for the installation directory and program folder, use the default selection, or choose another. We recommend that the default directory and location be used.
5. When prompted for **Setup Type**, choose from the available options. We recommend that you select **Typical**.
6. When prompted to select the Hardware Driver, check the entry:  
IOtech DaqBook-DaqBoard-WaveBook-TempBook series (32-bit).  
You may also select other drivers [for any other supported hardware you have] at this time.



**Selecting: *IOTech DaqBook-DaqBoard-WaveBook-TempBook Series [32-bit]*.**  
***Other device drivers are to be selected only if applicable.***



**Make sure a check mark appears next to your selection(s). Choices that are merely highlighted and not checked will not be installed.**

**Note:** If you allowed the IEEE488 (GPIB) drivers to be installed, you will be able to select the vendor.

A final screen displays the selected options about to be installed. Be sure the report matches your intended choices. Step back to modify settings if needed.

**Note:** After *software installation* is complete, you may be required to restart Windows. After restart, continue with the following section, *Install Low-Level Hardware Driver*.

## ***Install Low-Level Hardware Driver***

If the hardware drivers for your device are not installed, or if you have received a new IOTech Data Acquisition CD, follow these steps.



**Both the low-level drivers, installed from the Data Acquisition CD, and the DASYLab drivers, installed from the DASYLab CD, are required for DASYLab operation.**

**Note:** The installation will automatically perform version verification to ensure that only newer support is installed.

1. Launch the **IOTech Data Acquisition Software CD**. Note that the CD should *auto-start*. If the CD does not auto-start, run the CD **start.exe** from the Windows Desktop.
2. Select the 32-bit drivers for all hardware models that you will be using.
3. Select **DASYLab Drivers**, if you did not do so in step 2.
4. Click the **Start Install** button.

**Note:** When the low-level drivers are installed, *DaqView* (an out-of-the-box, data collection application) is also installed.



**Use DaqView to verify connections and configurations. This use of DaqView can be very beneficial, especially in applications making use of DBK signal conditioning cards and expansion modules.**

Verify your hardware installation using the Resource Test in the *Daq\* Configuration Control Panel Applet*. Refer to the data acquisition user's manual for instructions on using the applet and configuring device names.



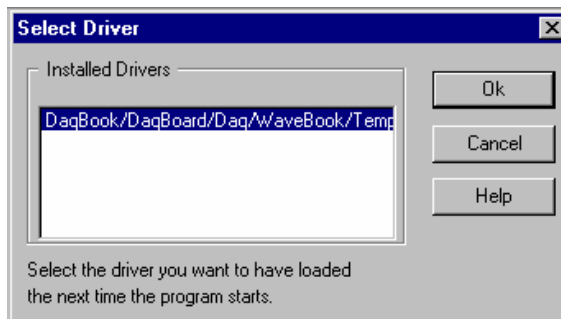
You can download the latest hardware and DASyLab drivers from our web site at [www.iotech.com](http://www.iotech.com).

*Selecting the Daq\* Configuration Control Panel Applet*

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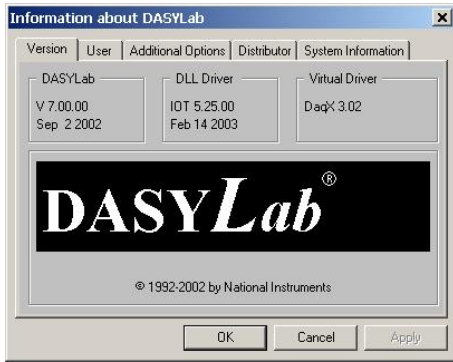
## Select the Driver

1. Start DASyLab and go to **Experiment** ⇒ **Select Driver** (see following figure).



*Experiment / Select Driver Window*

2. When the driver selection menu is presented, select the desired IOtech hardware products from the list. You may be prompted to restart DASyLab for the changes to take effect. If so, exit and restart DASyLab before continuing.
3. Click Help ⇒ About DASyLab. The Information about screen will appear (following figure).



### Information Screen

If you did not receive the version listed on your purchase order, contact IOtech's Technical Support Department at [productsupport@iotech.com](mailto:productsupport@iotech.com)

4. In the DLL Driver frame, make sure you have version IOT5.06 or higher.
5. In the Virtual Driver frame, make sure you have DaqX 2.09 or higher.
6. Use the Additional Options tab to confirm that the options you purchased have been properly installed.
  - DASYLab+ is called **Full**
  - *Basic* is called **Basic**
  - *Lite* is called **LE**
7. Click OK to close the Additional Options window.

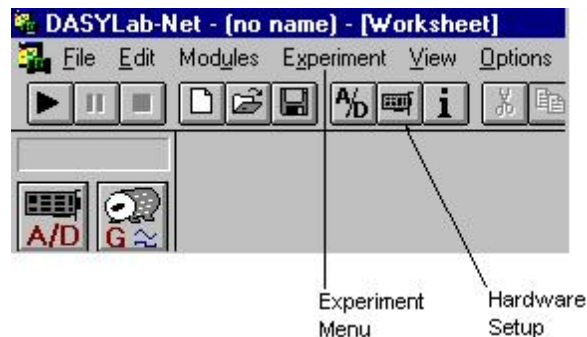
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## Configure the Hardware

Before configuring DASYLab's hardware settings, make sure the hardware is setup properly. Checking for valid readings with DaqView first is recommended. If the hardware has jumpers, make sure they are in the desired positions.

Use the following steps to setup DASYLab to work properly with your hardware.

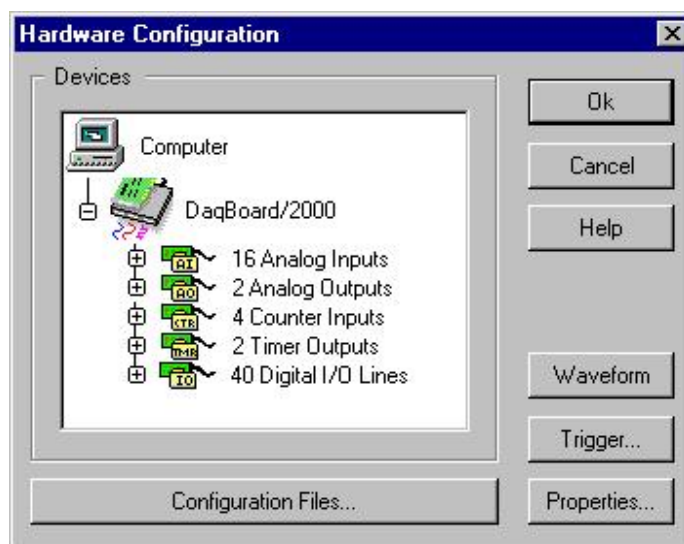
1. Launch the DASYLab application.
2. Open the **Hardware Configuration** dialog box in either of two ways:
  - (a) click on the circuit board in the horizontal toolbar, or
  - (b) click on Experiment in the menu bar and then click on Hardware Setup.



*Toolbar showing Experiment Menu and Hardware Setup Button*



A dialog box similar to the following will appear:



*Hardware Configuration Dialog Box*

The **Hardware Configuration** *Devices* region (see above figure) shows the hardware configuration as defined in the current configuration file.

**Notes:**

- Trigger Settings are configured from the Hardware Configuration dialog box.
- The Configuration file stores all current hardware settings (see following reference note).



**Reference Note:**

**Refer to the upcoming Configuration Files section for details regarding the Configuration File and its storing of hardware settings.**

3. To change the acquisition device:
  - (a) select the present acquisition device [in the tree]
  - (b) click on **Properties**

The **Card Setup** dialog box will appear.



*Card Setup Dialog Box*

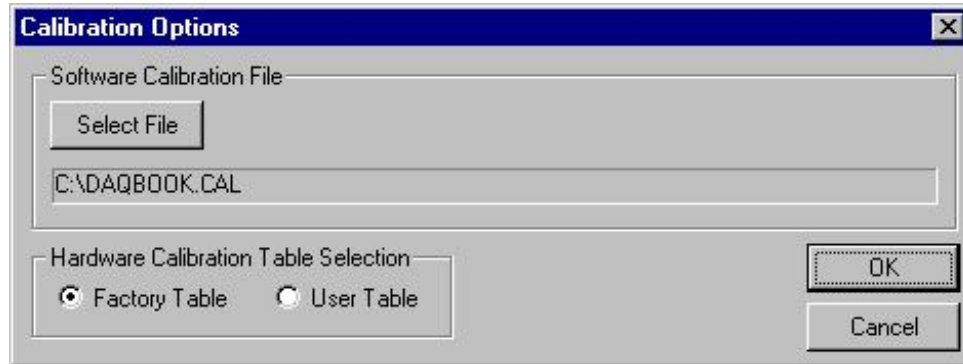
The **Card Setup** dialog box handles the selection of the main unit hardware and its configuration.

4. To select the device, simply scroll through the Device window and highlight the appropriate hardware.

**Note:** The hardware type selected must exactly match hardware configured through the Control Panel. If the device is not configured or properly installed, worksheets will not run, although they can still be created and modified.

### Additional Comments

- In the Configuration window, the Single-Ended/Differential and Unipolar/Bipolar selections must match the jumper settings on DaqBook/100/112/120 and TempBook. All other units are software programmable or fixed.
- The Clock Settings control allows DaqBoard/2000 users to select the available timing options.
- TempBook/66, DBK19, and DBK52 users may wish to use the software calibration file for thermocouple measurements. To select a file, click on the Calibration button. You will be warned if the file does not exist or contains invalid values. DBK19 and DBK52 channels will only use the calibration file if <Use calibration functions> is checked in the DBK Expansion dialog for each DBK card.
- DaqBoard/2000 users will also be allowed to select a Hardware Calibration Table (see following figure).



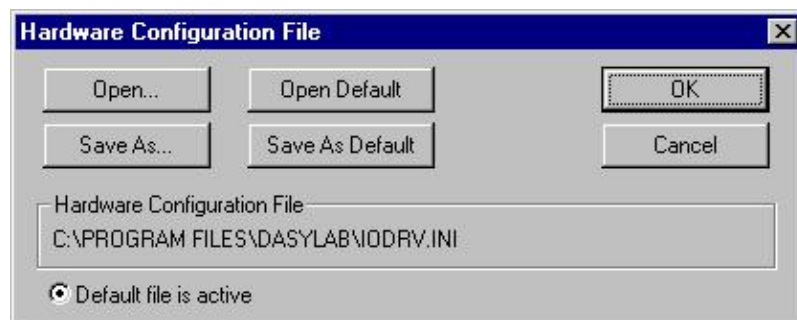
*Calibration Options*



These settings are saved in the Configuration File, but not with the worksheet.

### Configuration Files

The Hardware Configuration File saves ALL hardware settings not saved with the worksheet. Including the main unit type, DBK expansion options, trigger settings, etc. Note that the worksheet only saves the channel number and gain. The default configuration file is loaded when *DASYLab* first loads.



*Hardware Configuration File*

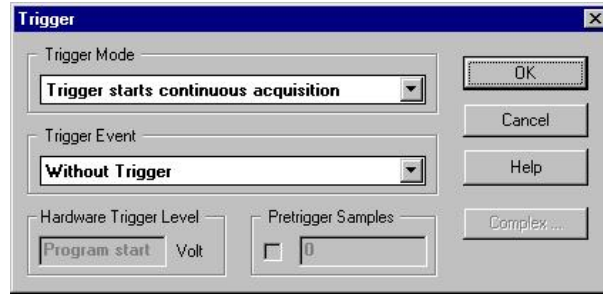
The configuration file PATH and NAME is saved with every worksheet. When a saved worksheet is loaded, the hardware configuration file is read. If the file does not exist there will be an opportunity to load another. The default file is used when *DASYLab* loads.



- ↑ The configuration file is updated whenever any setting is accepted, i.e., <OK> is clicked.
- ↑ When creating a new configuration file, change the name before changing any settings.
- ↑ When sharing worksheets include the configuration file.

## Trigger Settings

The trigger setup is done in the **Hardware Setup / Hardware Configuration** dialog box. Clicking on the **Trigger** button brings up the following dialog box:



*Trigger Dialog Box*

The Trigger Mode selects how the acquisition will run. The default, **“Trigger starts a continuous acquisition”** means that once the trigger event occurs, the acquisition will begin and will not stop until the acquisition is manually terminated.

DaqBook, Board/100/112/120/200/216/260 users can also select **“One Conversion per trigger.”** In this mode, 1 scan is taken per trigger. It can be used with TTL Trigger Event to simulate external clock. DaqBoard/2000 users have true external clock mode available. Supported DaqBoard and DaqBook Trigger Events are listed on the following page.

The **Trigger Event** is what will cause the acquisition to begin. If **“Without Trigger”** is selected, the start button in *DASYLab* begins the acquisition immediately. *DASYLab* software trigger modules can then be used for event detection. The *DASYLab* trigger modules are much more flexible than the Hardware Triggers.

**If a level is selected** (above, below, positive, or negative), then the signal on the first activated channel in *DASYLab* will begin the acquisition. The level can be between -10V and +10V. Once the signal crosses the level in the appropriate direction, the acquisition will start. Setting the trigger to a TTL edge will begin an acquisition on a rising or falling edge of the TTL trigger input.

**Note:** For Daq\* series devices, TTL trigger inputs are located on P1.  
The TTL triggers are hardware triggers.

### Hardware Level Trigger Details:



For **“True”** oscilloscope simulation, *software triggering with DASYLab* modules is recommended, as opposed to *hardware triggering*.

**Note:** Hardware triggering is only meaningful when in *Series Mode*.

- The first channel in the scan list is used (i.e. lowest channel number; main unit = 0-15, DBK on 0 = 16-31, DBK on 1 = 32-47, etc.)
- DBK7, DBK9, DBK19, DBK42, DBK44, DBK52 excluded.
- Voltage level must equal actual voltage input, not sensor units.

**Note:** DASyLab modules can also be used to set up software triggers of an infinite variety. You can set the trigger event to start a continuous measurement, or to perform one conversion for each channel.



- ↑ **When waiting for a hardware trigger DASyLab will appear frozen until the trigger event occurs.**
- ↑ **Trigger settings are saved in the Configuration File, but not with the worksheet.**

**DaqBoards and DaqBooks support the following trigger events:**

- Immediate
- TTL edge
- Voltage Level on 1st (lowest) channel in scan

In regard to Voltage Level on 1st (lowest) channel in scan.

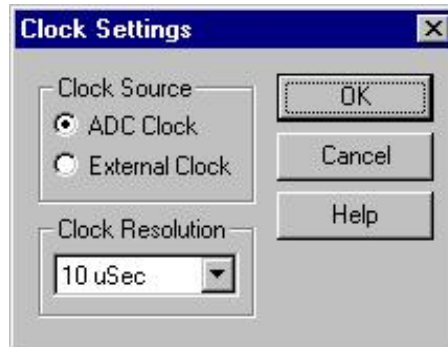
- ◇ TCs and RTDs are excluded.
- ◇ The value of the Voltage Level entered must be analog.
- ◇ During measurement, signals from the first activated DASyLab channel will be compared to the entered analog value.
- ◇ If the signal value rises above [or falls below] the entered analog value, a trigger event occurs.

### **Clock Settings (DaqBoard/2000 Series and DaqBook/2000 Series only)**

The Clock Settings control allows DaqBoard/2000 Series and DaqBook/2000 Series users to select desired timing option.

For these devices:

- the External Clock on P1 can be selected, or
- the A/D settle time can be changed from 5uSec (200Khz max) to 10uSec (100Khz max). 10uSec is recommended for high gain applications including DBK19, DBK52, and DBK13.



*Clock Settings, DaqBoard/2000 Series and DaqBook/2000 Series Only*



**Clock settings are saved in the Configuration File, but not with the worksheet.**

## Waveform Output (DaqBoard/Series \*and DaqBoard/2000 Series\*\* Devices only)

- \* Waveform Output does not apply to DaqBoard/2002 or DaqBoard/2005 as these two boards have no DACs.
- \*\* Waveform Output only applies to the DaqBoard/2000 Series devices when a DBK46 Analog Output card is installed in the device.

Waveform Output Control enables waveform output (streaming) from the DACs and/or the P3 digital port. Selected channels are placed into *waveform mode*, while those not selected remain in *direct output mode* (P3 Digital could also be input) and can be accessed via the standard D/A module.

### Notes Regarding Waveform Output:

- When using Waveform Output there is no additional module placed onto the worksheet.
- Waveform output start is synchronized to the ADC trigger (acquisition start).
- Waveforms continue to output until the worksheet ends.
- In *series mode* the waveforms restart each series.
- If ADC clock is selected as the source then each output update is synchronized with an analog scan



Waveform settings are saved in the Configuration File, but not with the worksheet.

### Data Source: Direct Setup

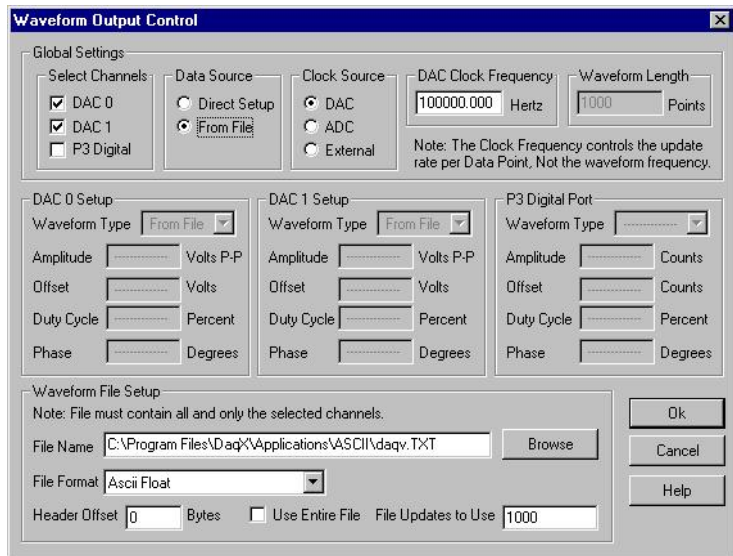
In this mode, 1 wavelength per channel is created as specified. The Frequency of the actual waveforms are Clock Frequency / Waveform Length. The Waveform Length multiplied by the number of enabled channels must be less than 100,000.

The screenshot shows the 'Waveform Output Control' dialog box with the 'Direct Setup' data source selected. The 'Global Settings' section includes 'Select Channels' (DAC 0 and DAC 1 checked, P3 Digital unchecked), 'Data Source' (Direct Setup selected), 'Clock Source' (DAC selected), 'DAC Clock Frequency' (100000.000 Hertz), and 'Waveform Length' (1000 Points). A note states: 'The Clock Frequency controls the update rate per Data Point, Not the waveform frequency.' The 'DAC 0 Setup' section shows Waveform Type: Sine, Amplitude: 10.000 Volts P-P, Offset: 0.000 Volts, Duty Cycle: 50 Percent, Phase: 0 Degrees. The 'DAC 1 Setup' section shows Waveform Type: Triangle, Amplitude: 15.000 Volts P-P, Offset: 1.000 Volts, Duty Cycle: 50 Percent, Phase: 90 Degrees. The 'P3 Digital Port' section shows Waveform Type: (empty), Amplitude: (empty) Counts, Offset: (empty) Counts, Duty Cycle: (empty) Percent, Phase: (empty) Degrees. The 'Waveform File Setup' section includes a note: 'File must contain all and only the selected channels.', File Name: C:\Program Files\Daq\X\Applications\ASCII\daqv.TXT, File Format: Ascii Float, Header Offset: 0 Bytes, and Use Entire File: File Updates to Use: 1000. Buttons for Ok, Cancel, and Help are visible on the right.

Waveform Output Control, Direct Setup

### Data Source: From File

The **From File** data source must contain *only interleaved data* for the exact number of enabled channels. The file will play out repeatedly. You can specify a section of the file via Header Offset Bytes and the Number of File Updates to Use (aggregate), or the entire file can be used.



*Waveform Output Control, From File*



**Waveform settings are saved in the Configuration File, but not with the worksheet.**

## DBK Card Configuration

For DASyLab to properly operate DBK modules, they must be configured through the Hardware Configuration dialog box. Also each DBK card connected must have its jumpers/switches properly set to match the configuration.

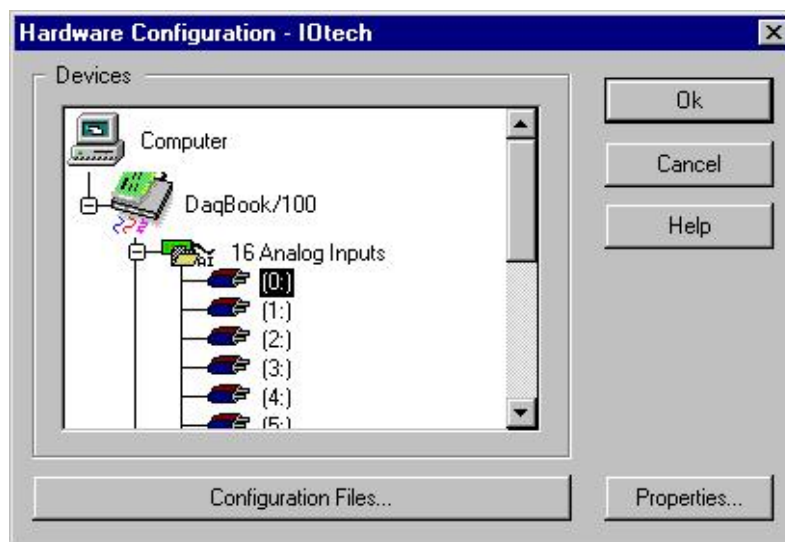


### Reference Note:

Consult the hardware manual (p/n 457-0901) in regard to connecting, configuring, and powering each DBK card or module.

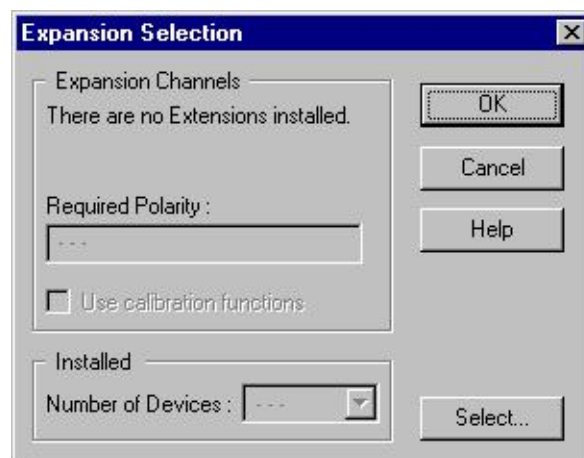


1. Click on Experiment and Hardware Setup or the Circuit board tool in the toolbar to open the Hardware Configuration dialog box.
2. To add Analog DBK cards, double click on the Analog Inputs card branching off the main unit. The card will expand into 16 connectors for the analog inputs.



*Hardware Configuration Dialog Box*

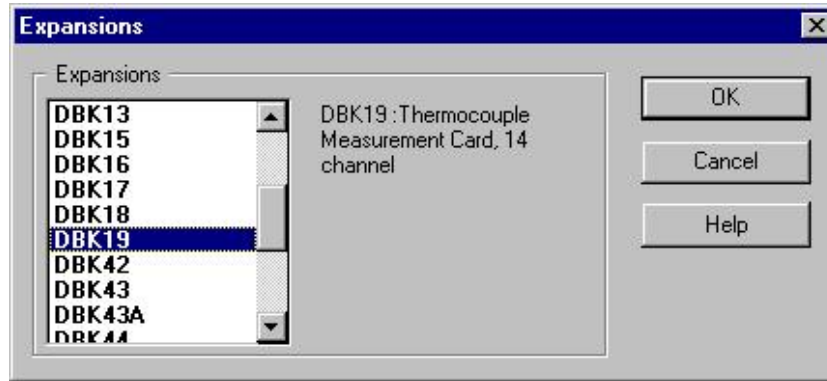
3. Click on the first available connector (0:) and then click on Properties. A dialog box appears with a list of installed expansion channels (if applicable).



*Expansion Selection Dialog Box*



- Click on the Select button (previous figure). An Expansions dialog box (following figure) appears with a list of DBK cards that are available for the particular channel. Scroll through the selections and highlight the card that is in your system, then click the OK button.



*Expansions Dialog Box, Selecting DBK19*

- If the expansion card you selected can have multiple cards on the same main unit channel (like the DBK4, 17, or 43), then:
  - Adjust the Number of Devices in the Installed area of the Expansion Selection dialog box [see figure in step 3]. Set the number equal to the number of cards you will have on the same main unit channel.
  - Click the OK button.
- DBK19 and DBK52 users can select to use the calibration file. Be sure the correct file is selected in the Configuration.



**Reference Note:**

**DBK19 and DBK52 users:** Refer to the *DBK19 and DBK52 Calibration File* section on page 1-25. for important information regarding a file that must be configured and located on your hard drive.

- Repeat the process for any remaining cards as needed.



**DBK expansion cards must be installed sequentially without gaps.**



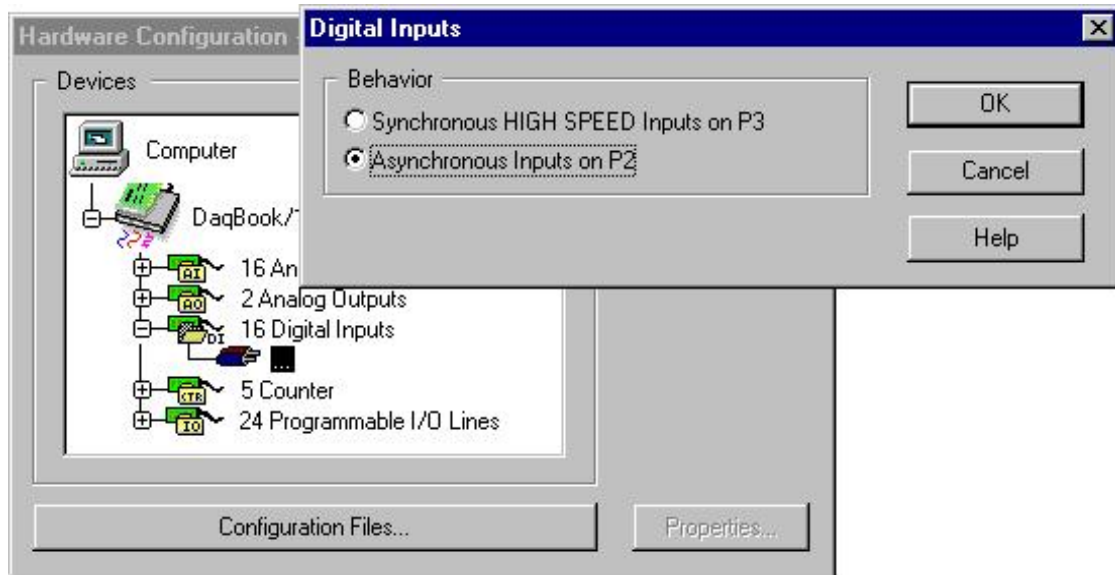
**DASYLab stores all the details concerning the hardware setup including DBK options that are in the Configuration File (but not with the worksheet). The worksheet file contains the name and path of the configuration file. If this file is deleted the worksheet may not load correctly. If a worksheet contains more channels than are configured (via DBKs) it will not load. If you have a worksheet that will not load, increase the number of DBK options installed until it loads.**

## Digital DBK Expansion

The DBK digital expansion option cards must be configured sequentially, just like analog expansion cards. Since the various boards have differing bit counts and addressing, great care must be taken when installing these options.



**For units other than the DaqBoard/2000, Digital Input on P2 requires that the P3 High-Speed Inputs be disabled.**



*Hardware Configuration Digital Inputs*

Add the digital DBK modules to the empty connector in the “Programmable I/O Lines” section. Add them in order of largest to smallest channel count (DBK20/21 then DBK23/24 then DBK25s). Then adjust the switches on the DBK cards such that the addresses are sequential.



**Configure Digital DBK expansion cards from largest channel count down; for example:**

**DBK20/21 ⇒ DBK23/24 ⇒ DBK25**

**Note that these settings are saved in the Configuration File, but not with the worksheet.**

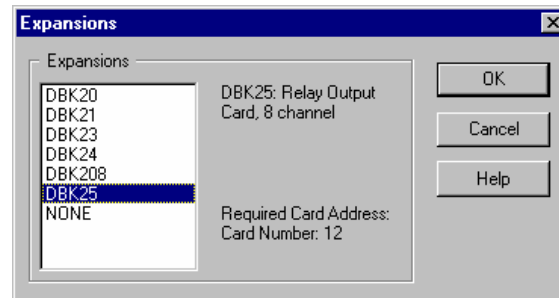
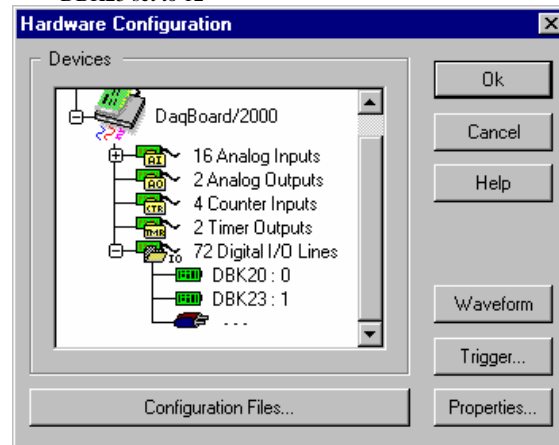
**Note that during the configuring process, you will see the correct address setting for each DBK card.**

Good and bad setup examples follow.

## Setup Examples

### Good

- DBK20 set to A
- DBK23 set to 2
- DBK25 set to 12



### Hardware Configuration – Example of a Good Setup

#### Bad

- DBK20 set to A
- DBK23 set to 0
- DBK25 set to 0

*They all would be occupying the same address (60H)*

#### Bad

- DBK25 set to 12
- DBK23 set to 2
- DBK20 set to A

*They are in the wrong order*

#### Bad

- DBK20 set to A
- DBK23 set to 3
- DBK25 set to 18

*Address "gaps" between the cards*

#### Bad

- DBK25 set to 0
- DBK23 set to 1
- DBK20 set to C

*Address "gaps" between the cards*

#### Bad

- DBK25 set to 0
- DBK25 set to 1
- DBK25 set to 2
- DBK25 set to 3

*Setting "3" not allowed*

#### Good

- DBK25 set to 0
- DBK25 set to 1
- DBK25 set to 2
- DBK25 set to 4

*Setting "3" is skipped correctly*

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## Supplemental Information for DaqBook and DaqBoard

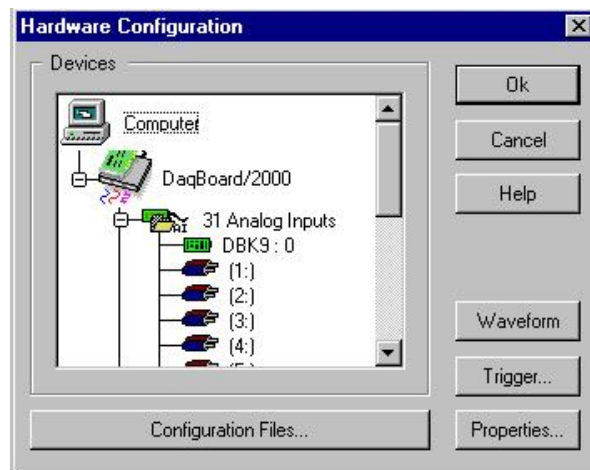
Some of the material presented in this section is redundant. The material is included to provide a better understanding of hardware setup through use of screen images.

### Using P1 Analog Inputs and DBK Signal Conditioning An example using a DaqBoard/2000 and a DBK9

1. Select **Experiment** ⇒ **Hardware setup**. This displays the current setup of the hardware
2. Double click the **Analog Inputs** icon for the device. Connector images appear, each image represents one single-ended analog input on the P1 port.
3. To place a DBK module on a P1 Analog Input connector:
  - (a) Double-click the applicable connector image (such as “0”).
  - (b) Click the **Select** button.
  - (c) Select the desired DBK module from the list provided. If DBK9 were selected we would end up with a screen image similar to that shown in the following figure.



**When adding a DBK module, the DBK modules must be added in sequential order with no gaps.**



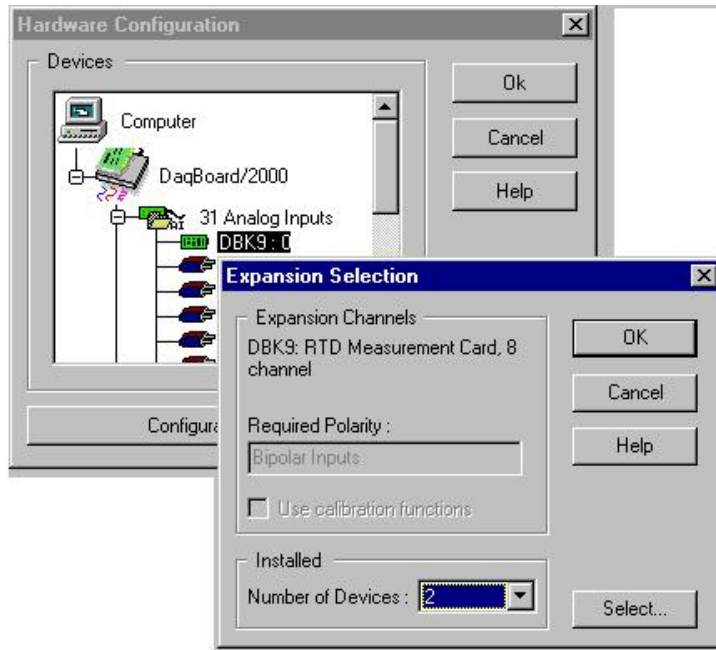
*Double-Clicking on the “DBK9: 0” Will Allow you to Configure the Card*



**All sub-addresses of a base system channel must be occupied, regardless of whether or not a DBK is actually present. If this is not performed, the program will not properly handle communication with cards on higher address numbers.**

For example, when using a DBK9, an 8-channel card, you must select 2 as the number of devices, *even if you are using only one DBK9*. (See following figure).

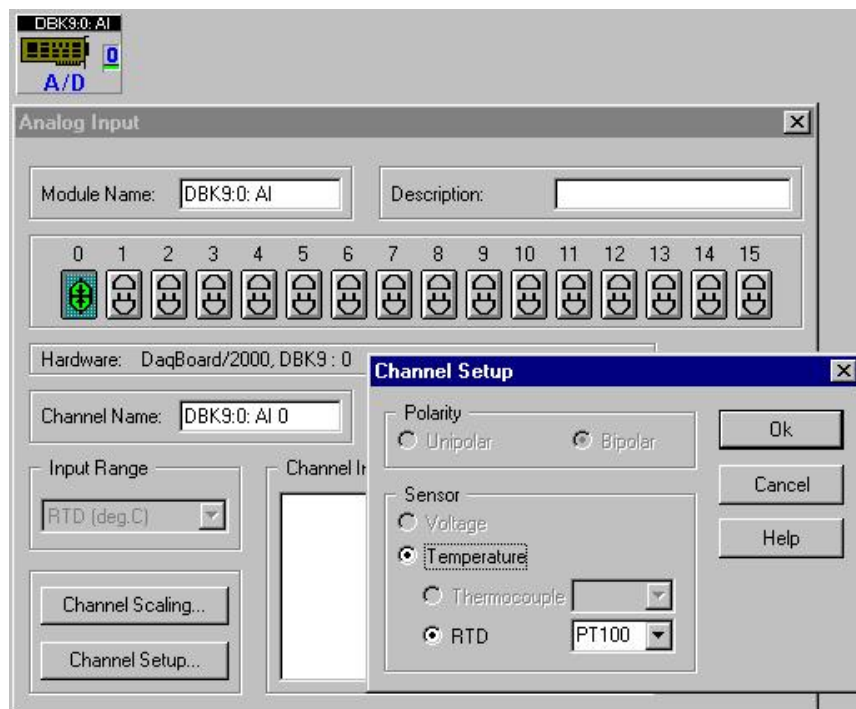
A single icon handles all cards within the same base address so you need to exercise care in matching the icon software channel to the hardware sub-address and channel.



*When using a DBK9, an 8-channel card, you must select 2 as the number of devices.*

After adding all of your DBK cards to your hardware setup, add your analog input modules to your worksheet as follows:

1. On your DASYLab Worksheet, go to **Modules**, then **Analog Input**. A selection menu that lists all hardware devices will appear.
2. After a module is added to the worksheet, double-click on it. In this example we have double-clicked on the “DBK9:0 AI” module icon. The following screen image resulted.



*Setting Channel at Connector 0 as an RTD*

3. Activate desired channels by *left-button clicking* them. Note that a single *right-click* deactivates the channel.

4. Click the **Channel Setup** button (see previous figure) to make channel setup selections.

Note that conversion of voltage units to engineering units can be made using the *channel scaling* within the analog input module or the scaling module outside the analog input module.

After completing your hardware setup, you are ready to add icons to your worksheet.



**Reference Note:**

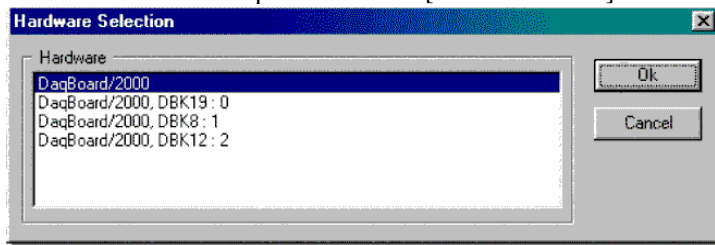
DBK19 and DBK52 users: Refer to the section, *DBK19 and DBK52 Calibration File* on page 1-25 for important information regarding a file that must be configured and located on your hard drive.

## Worksheet Operations for Analog Input

To add an analog input to your worksheet:

1. Select **Modules** ⇒ **Input/output** ⇒ **Analog Input**.

Select the desired data acquisition device [or DBK module] from the list.



*Hardware Selection, Selecting DaqBoard/2000*

2. Double-click the icon to view and/or modify its channel parameters.

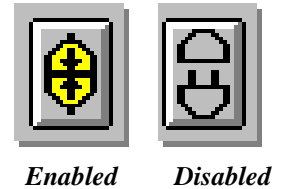
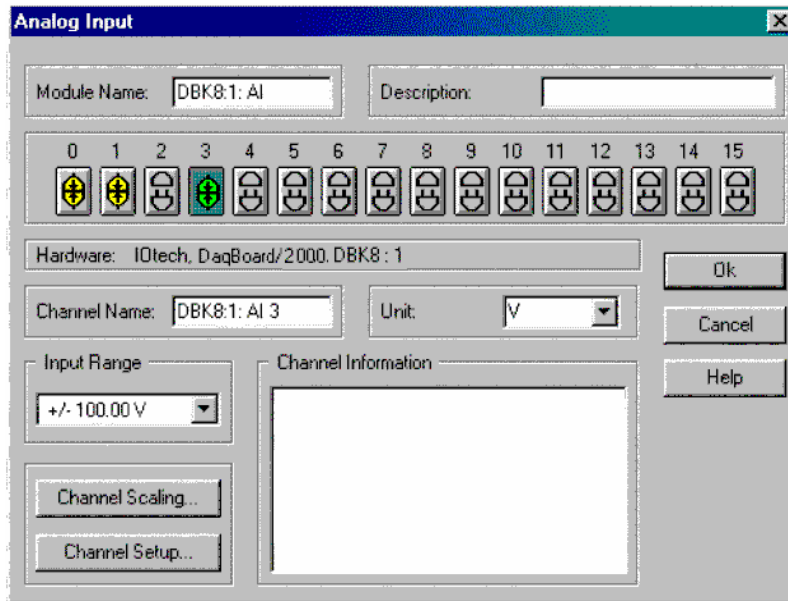


*A/D Icon for DBK19:0 Analog Input*

The row of connector images, near the top of the window, represent available channels.

Double-click a connector to *enable* (turn on) the associated channel. A single right click will *disable* a channel.

Click the channel setup button to make channel setup selections. Conversion of voltage units to engineering units can be made using the channel scaling within the analog input module or the scaling module outside the analog input module. See the *DASYLab* manual for details.



*Analog Input Module – Connector 3 Selected*

## Using P2 Digital I/O (Not available on 112 and 216 models)



If only the on-board P2 digital I/O is being used, no further configuration steps are required.

To use digital DBK expansion options:

1. Double click the **40 Digital I/O lines** icon within the **Hardware setup** window.
2. Double click the only available connector.
3. Click the *Select* button to view the available options.



**When using cards with different channel counts, arrange the cards so that cards with more channels appear at lower address than cards with lesser channels. In other words, DBK20/21, then DBK23/24, then DBK25..**



Reference Note:  
Refer to *DASYLab's* on-line help for detailed configuration examples.

After completing your hardware setup, you are ready to add icons to your worksheet.

Digital I/O Communication Notes for DaqBoard/2000 Series and DaqBook/2000 Series Only:

Communication with **digital input ports** is performed in a *synchronous* fashion.

Communication with **digital output ports** is performed in an *asynchronous* fashion.



**Reference Note:**  
More information regarding *Synchronous* and *Asynchronous* channels can be found on page 1-23 of this document.

## Using P3 DAC Output and P3 Digital Port Control - A DaqBoard/2000 Example

This example applies to DaqBoard/2000, /2001, /2003, /2005.

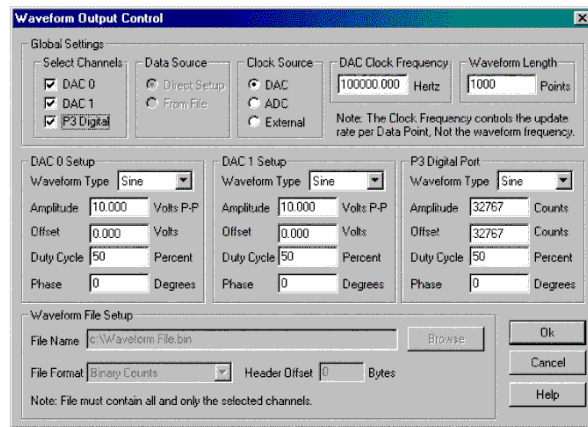
This example applies to DaqBook/2000 Series devices, but only if a DBK46 Analog Output card is installed in that device.

This example does **not** apply to DaqBook/100 Series, DaqBook/200 Series, DaqBoard/100 Series, or DaqBoard/200 Series devices.

1. Open the **Hardware Setup** window.
2. Click the **Waveform** button. This displays the configuration menu.
3. Select the desired item(s) for use with the waveform outputs
  - DAC0
  - DAC1
  - P3 digital ports



**Selecting DACs or the P3 port in Waveform Output Control (see following figure) prohibits their use for analog output control or digital output control. Use this window to configure waveform type, frequency, and amplitude for the respective hardware choices.**



**Waveform Output Control Window with DAC0, DAC1, P3 and Digital Channels Selected**

To use the DACs for programmed control, place an *analog output icon* on your worksheet by selecting **Modules** ⇒ **Input/Outputs** ⇒ **Analog Output**.

The *analog output icon* provides the ability to connect software control icons to the channels, as long as the DACs have not been selected for waveform control.

## Using P3 Counter Inputs

Because the communication with the P3 devices is synchronous, using a P3 counter is simply a matter of *adding the counter input icon to your worksheet*. Within that icon, you have the ability to configure the counters as four 16-bit counters, or as two 32-bit counters by making a selection in the **Channel Setup** window.

P3 counters can be configured to:

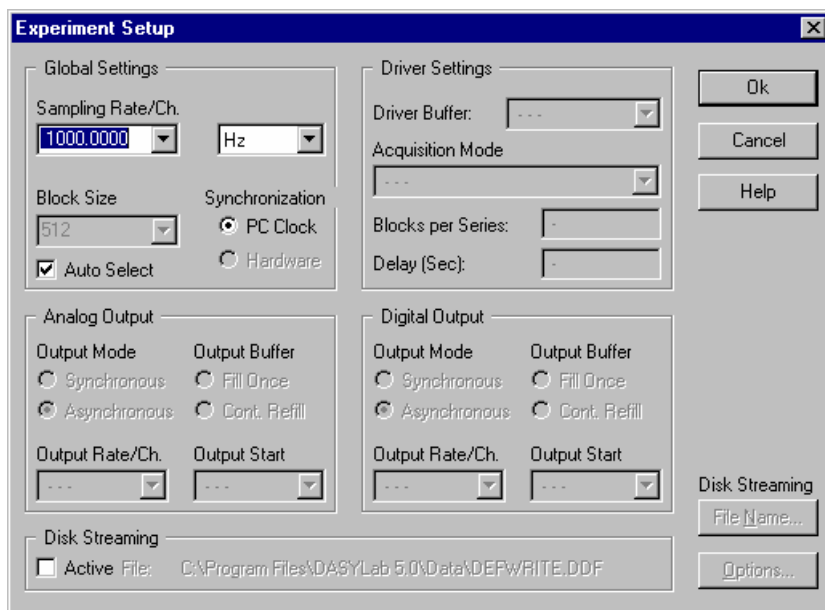
- count pulses
- totalize pulses
- calculate a frequency measurement



## General Experiment Setup

The Experiment Setup regulates the general operation of the programmable hardware. These parameters affect the underlying performance of the A/D block at run-time.

To open the dialog box, select “**Experiment** ⇒ **Experiment Setup**.” Note that you can also open the dialog box by clicking on the A/D icon in the toolbar.



*Experiment Setup Window*

There are five sections in the Experiment Setup window. Of these, only *Global Settings* and *Driver Settings* are used with IOtech hardware.

### Global Settings

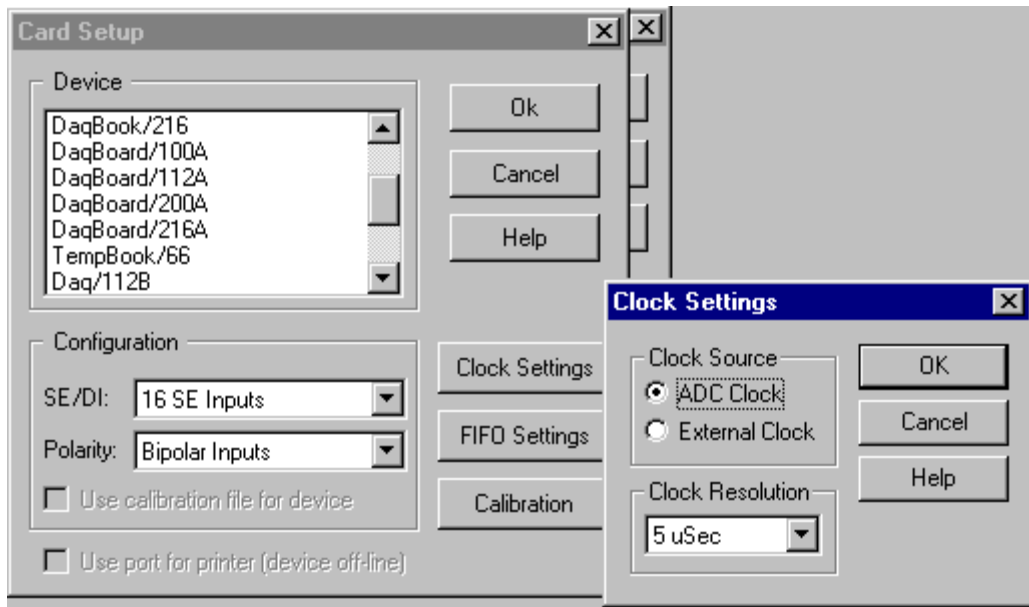
**Sampling Rate** – determines how fast the scans will be read

**Block Size** – determines how incoming data will be processed

**Synchronization** – sets the method of regulating system pacing

#### Sampling Rates

Device	Time Between Channel Scans
DaqBoard/2000 Series	5 $\mu$ Secs or 10 $\mu$ Secs
DaqBook/2000 Series	5 $\mu$ Secs or 10 $\mu$ Secs
Daq ISA-Type Devices	10 $\mu$ Secs
TempBook	10 $\mu$ Secs
WaveBook	1 $\mu$ Sec



*Card Setup and Clock Settings Windows*

*For example:* at 10 uSecs apart: if the Sampling Rate is set to 100Hz and there are 10 channels being read, then the 10 channels will be read in 100 uSec. 10 mSec later, they will be read again. The time between each channel read is fixed. The time between each scan read is adjustable using the Sampling Rate.

WaveBook:

For WaveBook, each channel in a scan is read 1 uSec apart.

*For example:* at 1 uSec apart if the Sampling Rate is set to 100Hz and there are 5 channels being read, the 5 channels will be read in 5 uSec. 10 mSec later, they will be read again. The time between each channel being read is fixed. The time between each scan read is adjustable using the Sampling rate.

**Block Size**

The Block Size determines how DASyLab will process the incoming data. DASyLab processes data *n samples* at a time (*n samples = 1 block*). With a block size of 512, five hundred and twelve samples will be collected before DASyLab processes any data. For slow acquisitions, this may be considered too long.

As a rough rule of thumb, large block sizes are suitable for high speed measurements small block sizes lead to short response times and are better suited for asynchronous output and online visualization.



**Use small block sizes for slow acquisitions and large block sizes for faster acquisitions (1Hz, block size of 1; 20kHz, block size of 2048).**

Sampled data can be transferred between the device and the PC in blocks of 2048 values each, or each sample can be transferred individually. In order to provide maximum performance and online visualization facilities, the appropriate transfer block size is selected automatically by the software.

Because DASyLab has to split computation time for the different actions performed, the block size specified in DASyLab defines how many samples are processed by DASyLab in a time-step.

## Synchronization

Each IOtech device makes use of its own internal pacer clock to regulate system pacing, also referred to as synchronization. Some manufacturers permit the use of the PC's internal clock for synchronization. Note that IOtech hardware pacers are more accurate than PC clocks.

**Synchronous Channels** are those that are scanned at the same point in time. These include:

- All analog input channels (local and DBK)
- The P3 digital channel

In addition to the above two channel types, DaqBoard/2000 includes the following synchronous channels:

- P2 digital (local or DBK)
- Counter inputs
- Waveform output when ADC clock source selected.

**Asynchronous Channels** are read or updated independently. This occurs at the block interval while *DASYLab* processes data. Their timing is generally regular but is based on processing speed and can not be guaranteed. Asynchronous channels include:

- All digital outputs
- P2 digital inputs on DaqBook, Board/100/120/200/260
- Direct voltage outputs (DaqBoard/2000 Waveform excluded)
- Timer output (F Out) changes.

**Note:** *DASYLab* updates the outputs between the completed scans of the analog input channels at the end of a block interval. The smaller the block size the more often the output.



**For proper operation of DBK2 and DBK5, you must set the Acquisition Mode to *Running or Isolated Series* rather than the typical, *Continuous* mode. This selection is made in the “Experiment Setup” window.**

Since direct analog outputs are asynchronous, they are typically not well suited for real-time waveform generation or fast process control.

For variable-frequency square-wave generation, use the frequency output module.

Care must be taken when mixing synchronous and asynchronous channels. Please ensure all channels have the same block size and sample interval when sharing a *DASYLab* analysis, display, or file module.

## Driver Settings

The Buffer Size sets the size of *DASYLab*'s buffer. This buffer is made up of a block of the computer's memory. As a background activity, *DASYLab* continuously collects data from the acquisition device at the programmed acquisition rate and places the data into its internal data buffer for processing. This ensures gapless data under all conditions. Data is stored here until *DASYLab* can process it.

The status of this buffer is shown (in bar-graph format) in the bottom right corner of the *DASYLab* window.

If *DASYLab* is unable to process the data as fast as it is being collected, the bar graph will begin to fill red. If *DASYLab*'s buffer completely fills, a buffer overrun error will be encountered.

The Acquisition Mode determines how *DASYLab* will acquire data.

In *Continuous Mode*, *DASYLab* acquires data indefinitely without breaks.

### Running Series:

- acquires the number of blocks specified in *Blocks Per Series*
- pauses for the number of seconds in *Delay(Sec)*
- repeats the process

The pauses are ignored and the data is seen as continuous.

*Isolated Series* is the same as *Running Series*, except the delays are recorded.

One Series acquires the specified number of blocks, then stops.

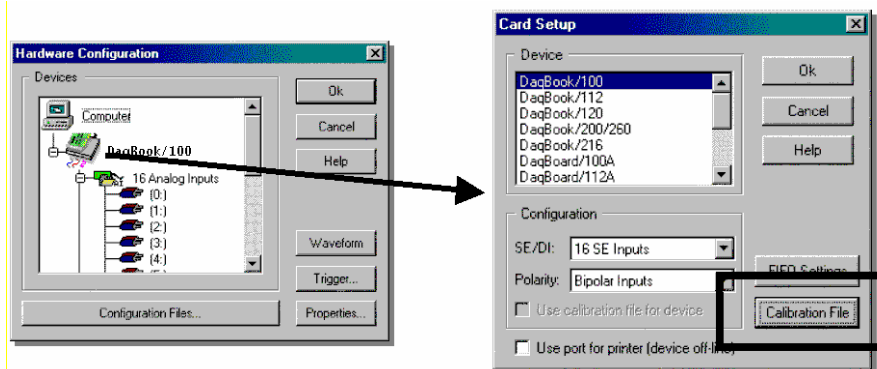


**For WaveBook, DBK2, and DBK5 applications, Series Mode must be used with Pre-Trigger enabled.**

## DBK19 and DBK52 Calibration File

DBK19 and DBK52 are shipped with a calibration file. This file needs to be configured and located on your hard drive. Refer to the documentation included with the DBK modules.

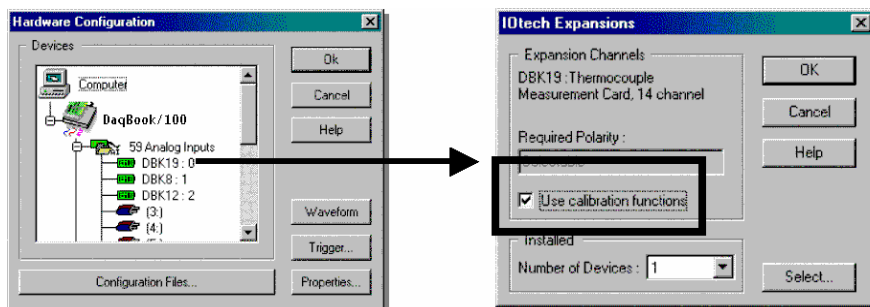
To specify the location of the calibration file, double click your acquisition device in the hardware configuration tree, then click Calibration File.



*Accessing the DBK19/DBK52 Calibration File*

To make use of the calibration file:

1. Double-click the DBK19 or DBK52 in the hardware configuration tree (as applicable).



*Example of Selecting the Calibration Function for use with DBK19*

2. Click the Use Calibration Function check box.



These settings are saved in the Configuration File, but not with the worksheet.



## Enhanced DASyLab Driver (with multiple WaveBook and WBK40/41 Support)

IOtech WaveBook users now have two choices of DASyLab drivers. These are:

- **Standard DASyLab Driver** (*DaqBoard/DaqBook/WaveBook/TempBook*)
- **Enhanced DASyLab Driver** (*with multiple WaveBook and WBK40/41 support*)

You should use the **Enhanced DASyLab Driver** if:

- You wish to run multiple WaveBook systems concurrently.
- You are using WBK40/41 modules in your system.

You should use the **Standard DASyLab Driver** if:

- You have already created DASyLab Worksheets for your system and you *do not* plan to use WBK40/41 modules or multiple WaveBooks in your system.
- You require optimal throughput performance while using a single WaveBook system.

If neither of the above scenarios applies, then either driver can be used for your WaveBook DASyLab application.

**Note:** You can download the latest hardware and DASyLab drives from our web site at [www.iotech.com](http://www.iotech.com).



### Reference Notes:

- Users of the **Enhanced DASyLab Driver** refer to this chapter.
- Users of the **Standard DASyLab Driver** refer to *Appendix A*.





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# Introduction

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The IOtech Enhanced driver uses the standard DASYSLab driver interface which dates back to the early versions of DASYSLab. This driver interface has traditionally supported a single hardware device, with optional channel expansion cards. IOtech's Standard DASYSLab driver support, is an example of the traditional single device support driver. Pertinent information for that driver is provided in Appendix A.

The IOtech Enhanced DASYSLab driver supports acquiring data from multiple clock synchronized devices through the standard DASYSLab Analog Input module. The driver accomplishes this by creating a single large virtual device inside DASYSLab with one data stream, to which data may be streamed from a variety of hardware devices.

## Key Features of the IOtech Enhanced DASYSLab Driver

- Driver supports using standard DASYSLab AI module, DASYSLab version's 6 and 7. The Analog Input Multi-Speed module introduced in DASYSLab version 7 is not supported..
- Supports multiple hardware devices synchronized to a common input scan clock. The IOtech driver layer DaqCOM provides master / slave mode to support the clock synchronization.
- To DASYSLab all devices setup in an experiment are viewed as a single hardware device with multiple expansion components. The IOtech Enhanced DASYSLab driver makes this happen.
- Single data stream, configured through the standard DASYSLab Experiment Setup dialog. All hardware devices and expansion modules will acquire data in a single scan list and input buffer. All MUST share same sample rate and block size from DASYSLab's view. Slow devices may run at a divisor of the master clock. The IOtech drivers handle padding scans of slow devices in the data buffer to create a uniform input data stream.
- DASYSLab hardware configuration may be imported/exported from IOtech DaqCOM and DaqExplorer through XML files.

# Getting Started

---

## Specifications

Hardware Devices	32 Maximum (driver limitation)
Expansion Modules	Limited only by hardware design ( typically 8 per device)
Analog Input Channels	512 Maximum (Sum of all devices & expansions)
Analog Output Channels	32 Maximum (Sum of all devices & expansions)
Digital I/O Ports	32 Maximum (Sum of all devices & expansions)
Counter Inputs	32 Maximum (Sum of all devices & expansions)
Frequency Output Channels	32 Maximum (Sum of all devices & expansions)
Maximum Aggregate Scan Rate	Limited by CPU, PC Memory, Network Bandwidth, etc.

## Supported Hardware

The IOtech Enhanced Driver for DASyLab supports the following data acquisition devices:

### WaveBook Devices

The WaveBook line contains expandable 12-bit or 16-bit data acquisition systems capable of analog and digital input at 1Mhz. The WaveBook connects to the PC via the PC's parallel port, or via an ethernet connection (E Models).

WaveBook/512  
WaveBook/512A  
WaveBook/512H  
WaveBook/516  
WaveBook/516A  
WaveBook/516E

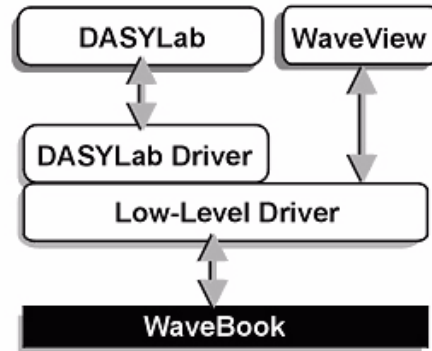
### WBK Modules

Analog signal conditioning and expansion modules for the WaveBook series. Provides additional analog channels and/or conditioning for various inputs (Thermocouples, Strain Gages, etc.).

WBK10  
WBK11  
WBK12  
WBK13  
WBK14  
WBK15  
WBK16  
WBK17  
WBK18  
WBK40  
WBK41

# Installation Guide

To use the Enhanced IOtech Driver for DASyLab, several layers of application and driver software is required as outlined in the figure below.

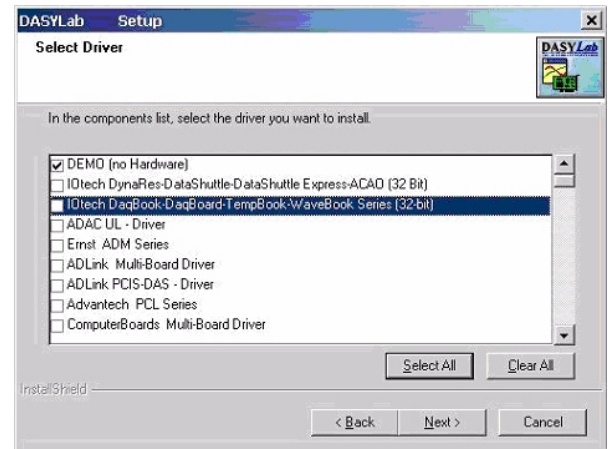


**Software Support Structure**

The installation process is therefore broken up into several steps. Some steps may be skipped if the software has previously been installed into the target computer.

## Install DASyLab Application

1. Launch DASyLab installation from the DASyLab CD. Note that the CD should auto-start. If the CD does not auto-start, run start.exe from the CD.
2. Select "Installation," then "Full Version." The actual installation process begins.
3. When prompted for your name, company and serial number, enter the requested data. Obtain the serial number from the CD jacket. Keep the number in a safe place for future installations and upgrades.
4. When prompted for the installation directory and program folder, use the default selection, or choose another. We recommend that the default directory and location be used.
5. When prompted for Setup Type, choose from the available options.
6. We recommend that you select *Typical*.
7. The Select Hardware Driver dialog will prompt for a driver selection. The **IOtech Enhanced DASyLab Driver** [to which this chapter refers to] is not distributed on the DASyLab program CD as this document goes to press.



The driver will be installed from the IOtech Data Acquisition CD along with the low level drivers (see next section). Installation of the DEMO driver, or any of the other listed drivers is optional at this time.

The **IOtech Enhanced DASyLab Driver** is not an upgrade to any of the other IOtech drivers listed, any combination may be installed concurrently without conflicts.

**Note:** If you allowed the IEEE488 (GPIB) drivers to be installed, you will be able to select the vendor.

8. A final screen displays the selected options about to be installed. Be sure the report matches your intended choices. Step back to modify settings if needed.

**Note:** After software installation is complete you may be required to restart Windows. After restart, continue with the following section.

## Install Low-Level Hardware Driver

If the hardware drivers for your device are not yet installed, or if you have received a new IOtech Data Acquisition CD, follow these steps.



**Both the low-level drivers, installed from the Data Acquisition CD, and the DASyLab drivers, installed from the DASyLab CD, are required for DASyLab operation.**

**Note:** The installation will automatically perform version verification to ensure that only newer support is installed.

1. Launch the Data Acquisition Software CD. Note that the CD should auto-start. If not, run start.exe from the CD.
2. Select the 32-bit drivers for all hardware models that you will be using.
3. Select DASyLab Drivers, if you did not do so in step 2.
4. Click the Start Install button.

**Note:** When the low-level drivers are installed, WaveView (an out-of-the-box data collection application) is also installed.

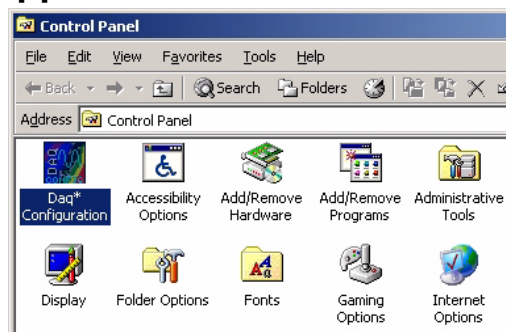
## Using the Daq\* Configuration Control Panel Applet

Main unit data acquisition devices such as the WaveBook, DaqBook, and DaqBoard series must be installed into the operating system by using the **Daq\* Configuration** control panel applet.

1. The Control Panel, as seen below, is accessed through the Windows Start Menu.
2. Add and configure your data acquisition device in the control Daq\* Configuration Control Panel Applet. Refer to the data acquisition user's manual for instructions on using the applet and configuring device names.
3. Verify your hardware installation using the Resource Test in the Daq\* Configuration Control Panel Applet.

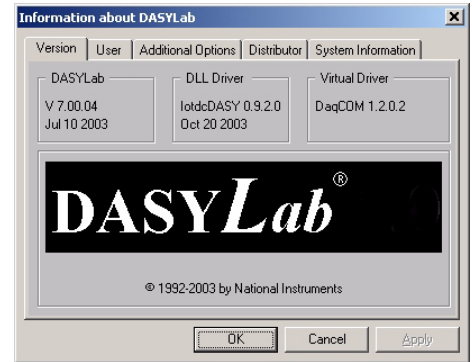
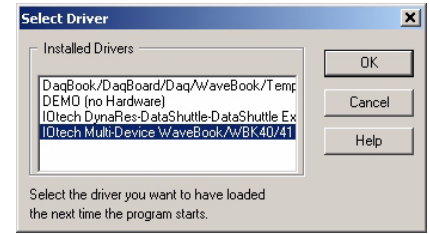


After completing the Daq\* Configuration test, use WaveView to verify connections and configurations. This use of WaveView can be very beneficial, especially in applications making use of WBK signal conditioning expansion modules.



## Select the IOtech Driver in DASyLab

1. Start DASyLab and go to Experiment / Select Driver (see figure).
2. When the driver selection menu is presented, select the desired IOtech hardware products from the list. You may be prompted to restart DASyLab for the changes to take effect. If so, exit and restart DASyLab before continuing.
3. Click Help -->About DASyLab. The Information about DASyLab screen will appear (see following figure).
4. In the DLL Driver frame, make sure the DLL name is iotdcDASY.
5. In the Virtual Driver frame, make sure you have DaqCOM 1.2.0.0 or higher.
6. "Information about DASyLab" Screen, "Version Tab" Selected. Viewing Version Frames for: DASyLab, DLL Driver, and Virtual Driver.
7. Use the Additional Options tab to confirm that the options you purchased have been properly installed. \* DASyLab+ is called **Full** \* Basic is called **Basic** \* Lite is called **LE**.
8. If you did not receive the version listed on your purchase order, contact IOtech's Technical Support Department at [ProductSupport@iotech.com](mailto:ProductSupport@iotech.com).
9. Click OK to close the Additional Options window.



This completes the software installation process.

The next step that must be completed is Hardware Configuration in DASyLab.

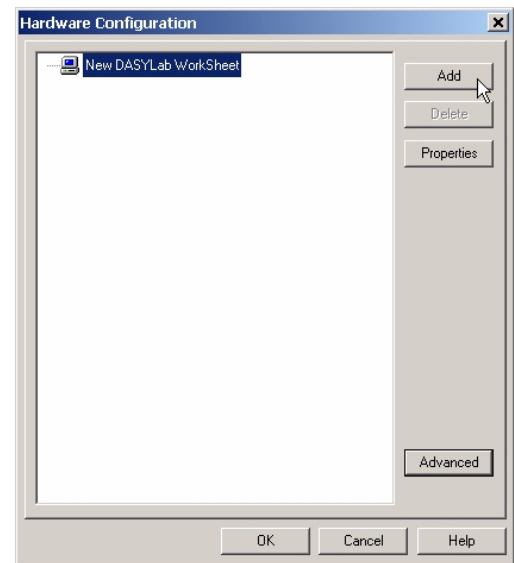
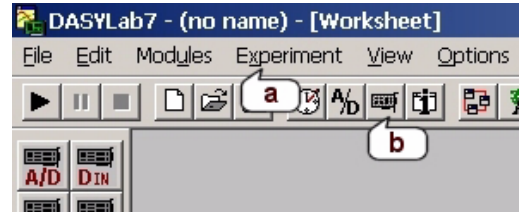
# Hardware Configuration in DASyLab

Before configuring DASyLab's hardware settings, make sure the hardware is setup properly. Checking for valid readings with WaveView first is recommended. If the hardware has jumpers, make sure they are in the desired positions.

## Installing the Main System Devices

Use the following steps to setup DASyLab to work properly with your hardware.

1. Launch the DASyLab application.
2. Open the Hardware Configuration dialog box in either of two ways: (a) click on the circuit board in the horizontal toolbar, or (b) click on Experiment in the menu bar and then click on Hardware Setup.. A Hardware Configuration dialog box will appear, similar to that shown in the following figure.
3. To add an acquisition device: (a) Select the top level tree node [from the configuration tree]. (b) Click on the <Add> button. The Hardware Configuration dialog also may be controlled by using right click accessible popup-menus. The Card Setup dialog box will appear (following figure). The hardware types listed will match the hardware configured through the Control Panel. If the device was not configured or properly installed, the selection process may fail and worksheets will not run.
4. The Available System Devices dialog box handles the selection of the main unit hardware and it's configuration. To select the device, simply scroll through the Device window and highlight the appropriate hardware. At the time the <Select> button is clicked, the driver will auto-detect any attached WBK modules to a WaveBook series device. To best use this feature, read the section below covering WBK module configuration before completing this step.
5. The figure above shows the Hardware Configuration dialog after installing a WaveBook with a WBK15 attached.
6. Any software programmable settings associated with this data acquisition device, in this case WaveBook0, is configurable at this time by clicking the <Properties> button.



## Installing WBK Expansion Modules

The IOtech Enhanced driver will auto-detect attached WBK expansion modules to a WaveBook at the time a WaveBook is installed into the DASyLab hardware tree. If the WaveBook device was previously installed, and all attached WBK modules have not been auto-detected, there are two ways to update the module configuration:

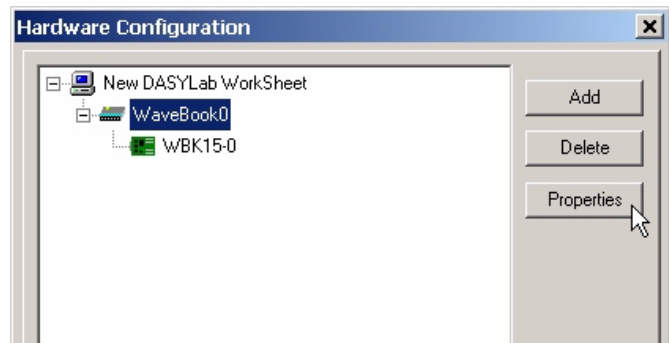
- For new installations, the simplest method is to <Delete> the WaveBook device and then <Add> it back into the hardware tree. The WaveBook will search for all attached WBK modules upon creation. The disadvantage to this method is that the WaveBook and all WBK modules will be reset to default configuration.
- For existing installations where new WBK modules are to be added, the safest method is to manually <Add> the new WBK modules following the steps below. This method will preserve the settings in the WaveBook and existing WBK modules. See the section [Manually Installing WBK Expansion Modules](#).



WBK

WBK module auto detection and the following manual installation information refers to standard WBK expansion modules which attach to the expansion control and expansion signal ports of WaveBook devices. Modules in this family include:

- WBK10
- WBK14
- WBK15
- WBK16
- WBK17
- WBK18



The WBK11, WBK12, and WBK13 are option module cards which install internally inside a WaveBook or WBK10. These module types are auto-detected, and require no installation.

The WBK40 and WBK41 have a significantly different hardware architecture and attach to any one of three DB25 parallel expansion ports on a WaveBook/516E. The WBK40/41 type modules are not auto detectable and do not follow the rules outlined for WBK expansion modules. See the WBK40/41 sections for details on configuring these module types.

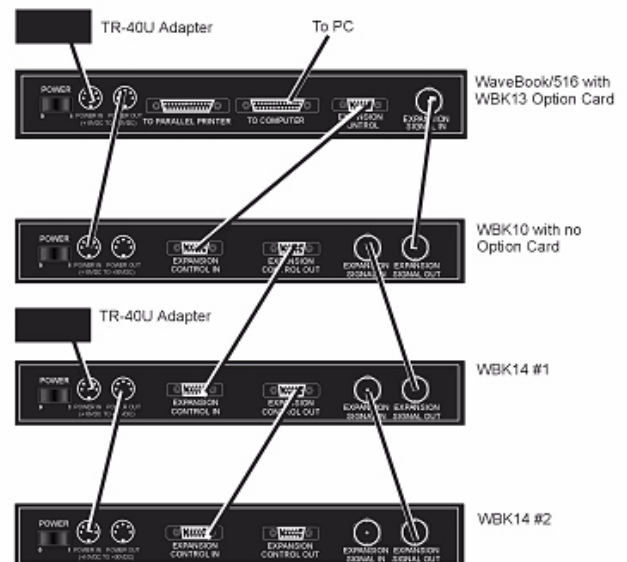
## WBK Daisy-Chain Rules

WBK modules are physically connected in series. The WaveBook device automatically detects the order WBK modules are connected and assigns each module a position number between 1 and 8, depending on the physical location in the series.

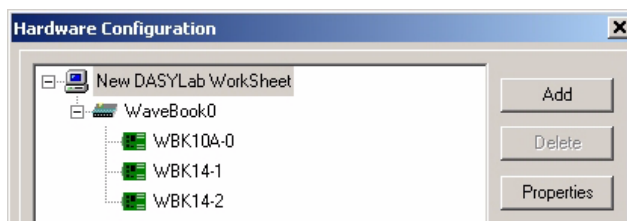
When configuring WBK modules for use inside DASYLab always observe the following constraints.

1. Ensure that WBK modules are always positioned in sequential order.
2. Never leave a gap in connector assignments. For example, if three WBKs were added, they must occupy connectors 0-1-2, not 0-1-3 (see figure below).
3. Make sure that the WBKs in the connector list are in the same order as they appear in the physical hardware daisy chain (see previous figure).
4. The WBK11, WBK12, WBK13, and WBK30 options are automatically detected when a WaveBook is selected.
5. Each WaveBook can have up to eight WBK expansion modules attached to it. The first WBK will have an identification of [0] and the eighth WBK will have an identification number of [7].

**Note:** Since WBK40/41 modules types attach to one of the WaveBook's DB25 parallel ports [instead of the standard WaveBook signal expansion port] they do occupy any of the eight available standard expansion positions.



**The IOtech Enhanced DASYLab driver will auto-detect WBK modules [except WBK40/41] that are attached to the WaveBook when it is installed into the DASYLab hardware tree. When the auto-detect feature is used [see next section], module position assignment rules are automatically enforced.**

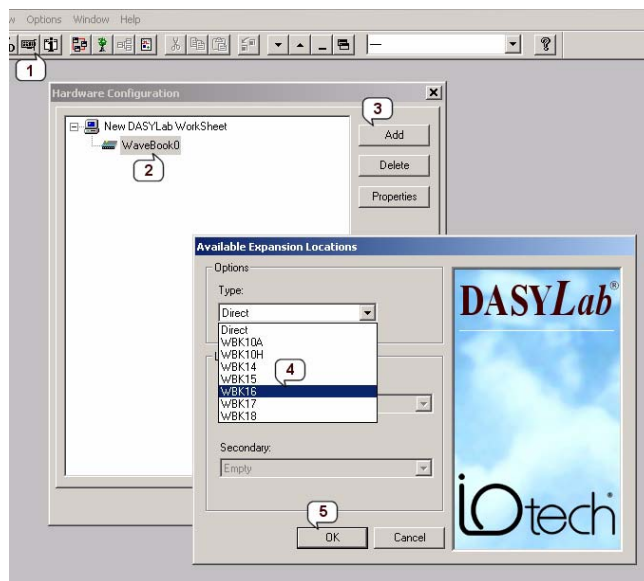




## Manually Installing WBK Expansion Module

Complete the following steps to add a WBK module to the DASYLab setup. You will need to repeat steps 2 through 5 for each additional module. If you have not already done so, review the preceding section, *WBK Daisy-Chain Rules*.

1. Single-click the <Hardware Setup> button. The Hardware Configuration dialog box will appear.
2. Single-click on a main WaveBook device node to which the WBK Module will be installed.
3. Click the <Add> button. The Available Expansion Locations dialog box appears with a list of available expansion devices.
4. Select the desired device. In the above example WBK16 has been selected. The Available Expansion Locations dialog box has list controls to allow selection of the Primary and Secondary location of the WBK expansion. The Primary location for a WBK expansion module will always be WaveBookExpansionPort. When selecting the Secondary location, never leave a gap in module position assignments.
5. Click the <OK> button to accept changes and close the Available Expansion Locations dialog box.



# Upgrading from Previous Versions

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This is the initial release of the IOtech Enhanced Driver for DASyLab. It is a completely new design, not an upgrade to IOtech's Standard Driver.

If you have existing DASyLab worksheets using the Standard single device driver, it may be possible to switch to the new Enhanced driver. However, the features and functionality of the two drivers in some configurations may not match exactly.

**Unless you need to add additional or new devices not supported in the Standard Driver, upgrading is not recommended.**

At this time, there is no automated method to read the hardware configuration from the standard support into the new XML based configuration of the Enhanced Driver. To open a DASyLab worksheet [which was designed for the Standard Driver] perform the following steps:

1. Make a backup of your worksheet .DSB file.
2. Open DASyLab worksheet with Standard Driver active and closely exam the hardware configuration tree. Make notes or screen shots as necessary.
3. Set the IOtech Enhanced Driver active in DASyLab.
4. Restart DASyLab as needed. When DASyLab reloads check the Help | About dialog and verify the Enhanced Driver is loaded.
5. Open the hardware configuration dialog. Add devices to "New DASyLab Worksheet" tree view to match the configuration used by the Standard Driver. Click OK to close hardware configuration dialog when done.
6. Open the worksheet.
7. If you've successfully duplicated the configuration, no errors should occur.
8. Save the worksheet with the Enhanced Driver active. The driver will create an XML file with the same base name as the worksheet to store your configuration.

# Configuration Files

When working inside the DASyLab environment, the process of saving project designs is basically split into two parts:

1. DASyLab saves the state of its software modules and their connections into a "WorkSheet" file with a .DSB extension.
2. The IOtech Enhanced Driver saves the state of all hardware configured for use inside DASyLab into XML configuration files. The driver creates this XML configuration file when DASyLab notifies it the worksheet is being saved. The XML configuration file is created along with the associated worksheet DSB file using the same base file name and directory.

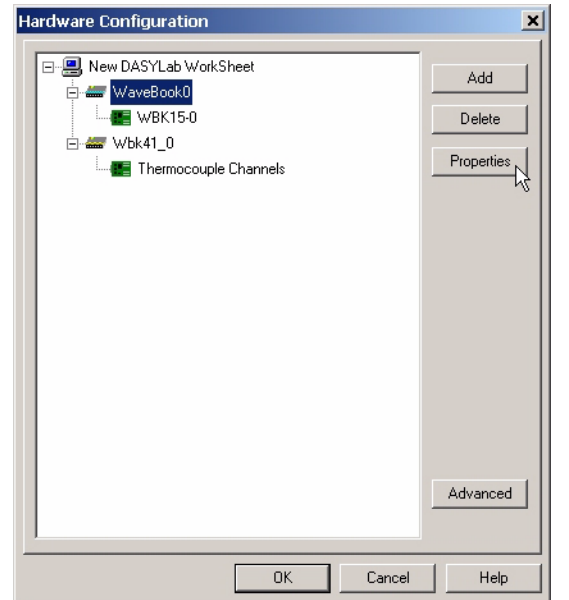
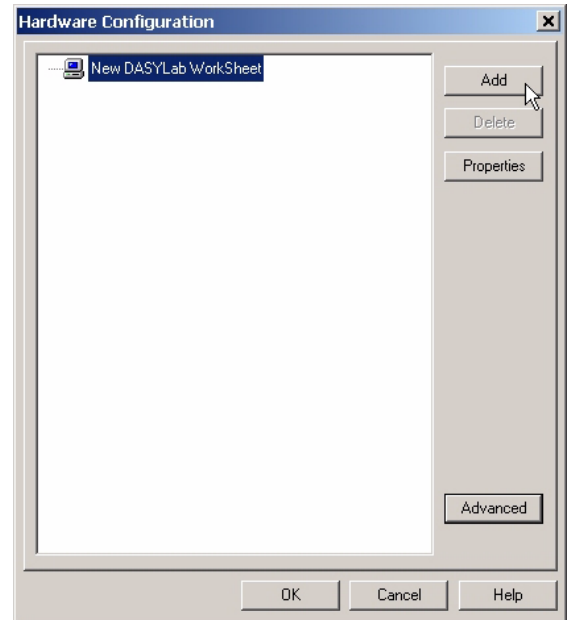
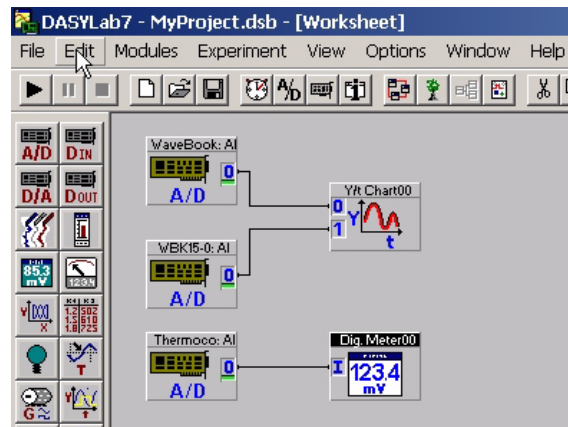
When the DASyLab application first starts up, the IOtech Enhanced Driver loads the default "New DASyLab WorkSheet" XML configuration file into memory.

When the Hardware Configuration dialog box is displayed, the contents of the default XML configuration is displayed. For new installations, the configuration will be empty as shown below.

Any devices added to the New DASyLab WorkSheet configuration and/or properties set will be saved into the default XML file upon clicking OK. For example, if the configuration below is accepted with the OK button, each time DASyLab loads this configuration will be loaded.

When designing a new worksheet, the hardware and properties configured in the "New DASyLab WorkSheet" will be available for use.

Once the DASyLab worksheet is designed, upon saving the worksheet an XML configuration file is created with the worksheet to save a unique copy of the hardware devices and settings. The XML file associated with the worksheet is saved into the same directory as the worksheet, with the same base file name plus the .XML extension.



After a DASyLab worksheet has been saved, when viewing the hardware configuration the top level name on the tree view will show the name of the worksheet. Any changes made to the hardware configuration for the worksheet will only affect this specific worksheet.

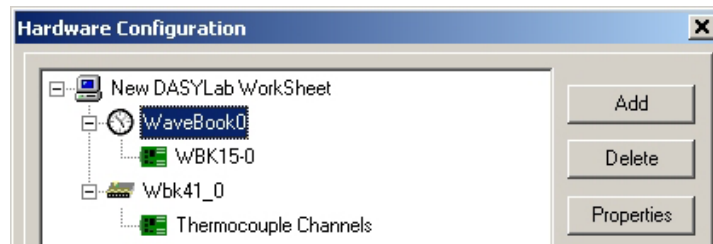
To reload the default "New DASyLab WorkSheet" configuration into memory, select File | New WorkSheet from the DASyLab menu.

The bulleted list shows a breakdown of which settings are saved by the driver into the XML configuration file. Under normal conditions this process should be transparent to the DASyLab user, but is provided here for reference.

- All hardware settings configured via the **Hardware Configuration** dialog.
- Settings configured inside the **Channel Setup** dialog, which is accessed from the DASyLab Analog Input module.
- The **Input Range** list box setting selected inside the DASyLab Analog Input module.

All other worksheet settings, such as the sampling rate, block size, and buffer size are stored by DASyLab inside its DSB worksheet file.

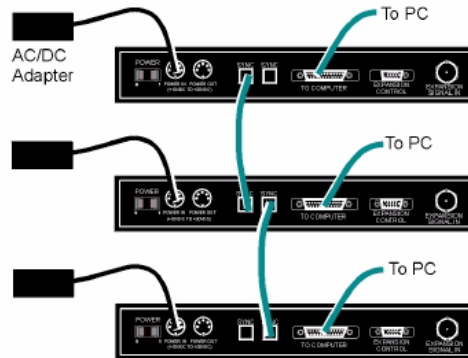
- The XML configuration file is updated whenever the OK button in the Hardware Configuration dialog is clicked, and whenever the DASyLab worksheet is saved.
- When sharing worksheets include the XML configuration file.



# Multiple Device Support

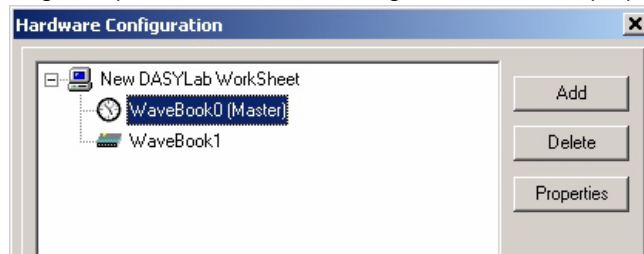
The IOtech Enhanced Driver supports acquiring data from devices through the standard DASyLab Analog Input module. To DASyLab all devices setup in an experiment are a single large virtual hardware device with multiple expansion components. The Analog Input Multi-Speed module introduced in DASyLab version 7 is not supported.

All devices return data through a single data stream to DASyLab, which is configured through the standard DASyLab Experiment Setup dialog. In order to provide precise time correlation between readings across multiple measurement devices, hardware clock synchronization must be used. Hardware measurement devices supporting this mode have two SYNC ports each, which must be daisy-chained together (see below).



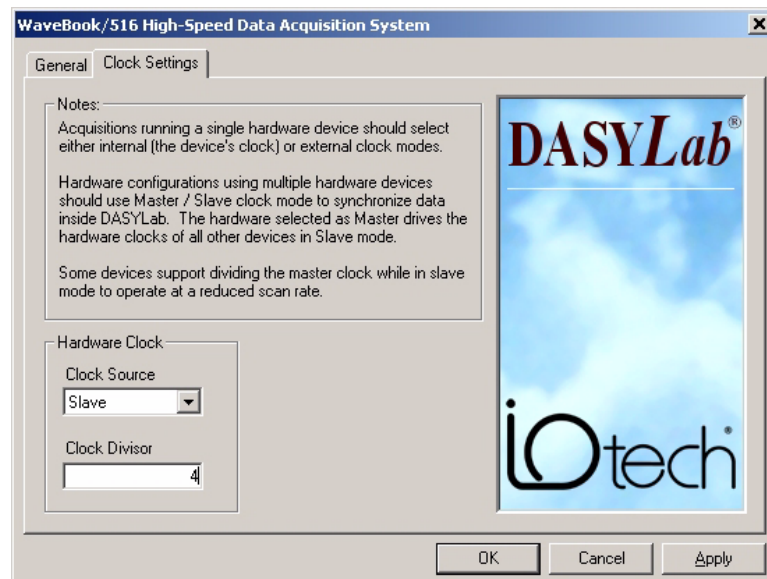
*Three "A-Series" WaveBooks, Synchronized*

To use the hardware SYNC feature, the **Clock Source** parameter for each measurement device must be configured in software to create a Master / Slave relationship between devices. For more information, the Using Multiple WaveBooks tutorial details the steps to installing multiple wavebooks and setting the clock source property.

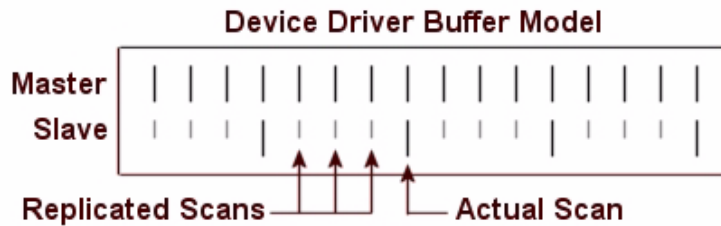


Using this hardware clock SYNC method, all devices MUST share same sample rate and block size from DASyLab's view. However, in the hardware slow devices may run at a divisor of the master clock. The IOtech drivers handle padding scans of slow devices in the data buffer to create a uniform input data stream.

Each device running in **Slave** clock mode may specify a unique **Clock Divisor** setting to reduce the hardware scan rate. In the example below, a slave WaveBook series device is configured to acquire a scan once for every 4 scans the master WaveBook device acquires.



The following is an example of data buffering with a slave device using a divide by 4 clock. The slave performs one scan at every fourth master scan. The drivers backfill [replicated scans] the slave data buffer to create uniform length, keeping the slave and master devices synchronized.



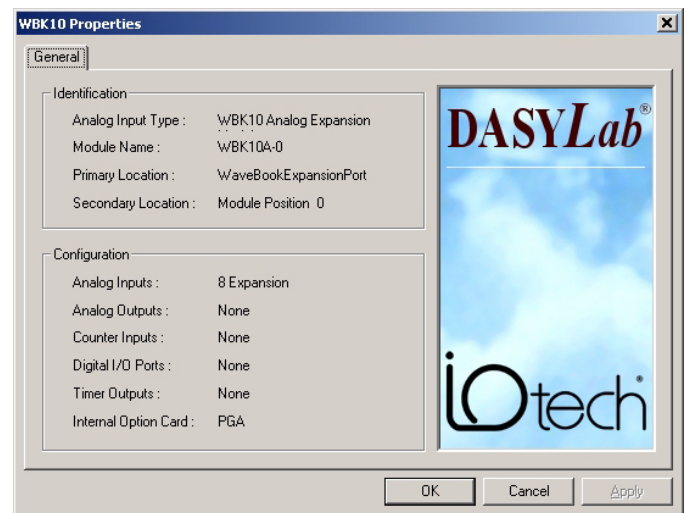
**At least one channel from the Master device must be used in the DASyLab worksheet when running Master / Slave mode. The Master device creates the scan clock for the Slave devices. With no active channels the Master device will not run.**

## WBK Expansion Modules

### WBK10 Expansion Module

Settings with module wide scope are accessed through the Hardware Configuration dialog in all WBK modules. To access the WBK10's module level configuration follow these steps:

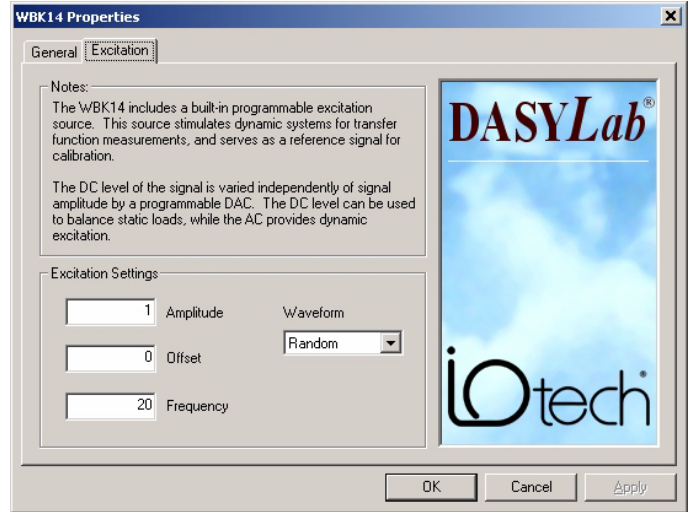
1. Open the Hardware Configuration dialog box. This is accessed through the Experiment | Hardware Setup menu in DASyLab.
2. Single-click on the WBK10 icon to select the module in the device hardware tree view. (see following figure, left-hand side)..
3. Single-click on the <Properties> button.
4. The WBK10's Properties dialog pages will appear. (following figure, right-hand image).
5. The General tab sheet provides read-only information about the WBK module. The Module Name shown here matches the name used by DASyLab. The Secondary Location shown here must match the physical installation location of the WBK module (see Notes Regarding Daisy-Chains).
6. The Internal Option Card field in the General tab sheet provides read-only information about the type of option card detected inside the WBK10 at installation time. The installed option card (PGA, WBK11, WBK12, or WBK13) type effects the programmable channel features available for the WBK10.
7. The WBK10 has no adjustable module level settings. Click the <OK> button to exit the dialog.



## WBK14 Expansion Module

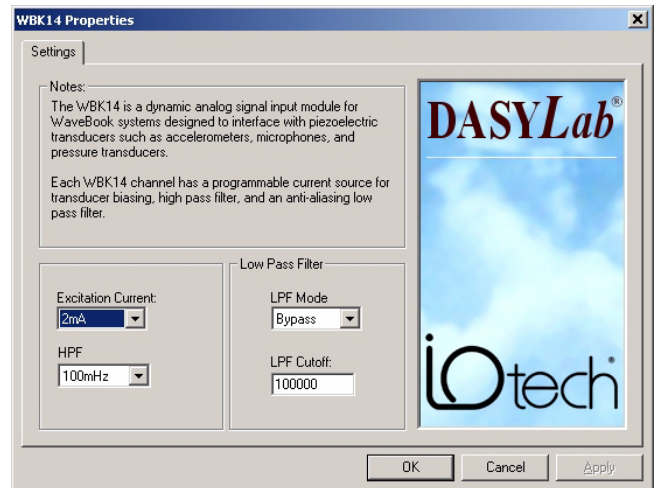
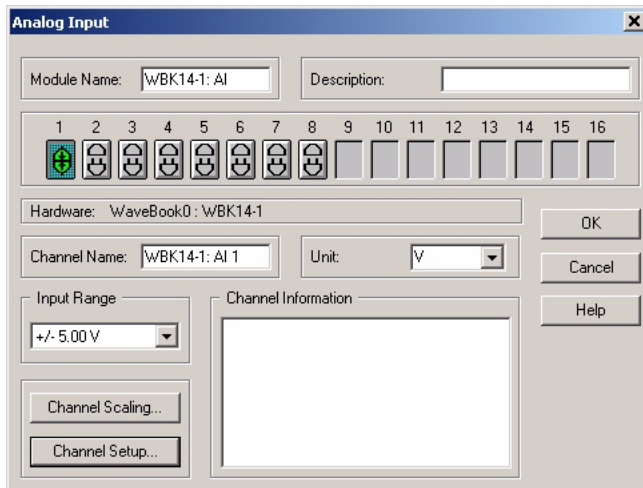
Settings with module wide scope are accessed through the Hardware Configuration dialog in all WBK modules. To access the WBK14's module level configuration follow these steps:

1. Open the Hardware Configuration dialog box. This is accessed through the Experiment | Hardware Setup menu in DASyLab.
2. Single-click on the WBK14 icon to select the module in the device hardware tree view.
3. Single-click on the <Properties> button.
4. The WBK14 Properties dialog pages will appear. (following figure, right-hand image).
5. The General tab sheet provides read-only information about the WBK module. The Module Name shown here matches the name used by DASyLab. The Secondary Location shown here must match the physical installation location of the WBK module (see WBK Daisy-Chain Rules)
6. The WBK14's excitation source waveform output is configurable through settings on the Excitation tab sheet.



### To access WBK14's programmable channel features:

1. Double-click on the worksheet's WBK14 AI icon. The Analog Input dialog box will appear.
2. On the Analog Input dialog box, click the <Channel Setup> button. A Channel Setup dialog box will appear with Filter and Current Source options.
3. If you desire to set a hardware-to-sensor scaling factor, click the <Channel Scaling> button. This feature provides a means of converting the incoming voltages to desired engineering units. Note that this function can also be accomplished using DASyLab's scaling module.



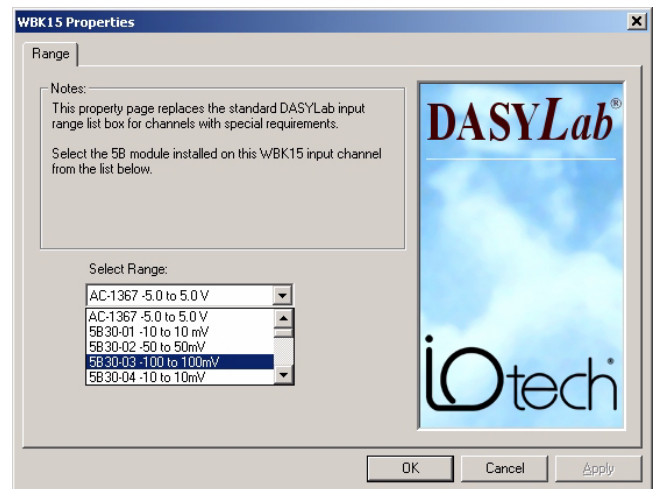
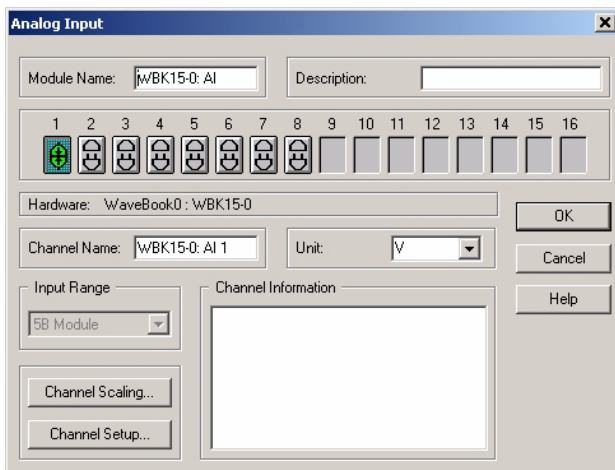
## WBK15 Expansion Module

Settings with module wide scope are accessed through the Hardware Configuration dialog in all WBK modules. To access the WBK15's module level configuration follow these steps:

1. Open the Hardware Configuration dialog box. This is accessed through the Experiment | Hardware Setup menu in DASyLab.
2. Single-click on the WBK15 icon to select the module in the device hardware tree view.
3. Single-click on the <Properties> button.
4. The WBK15's Properties dialog pages will appear. (following figure, right-hand image).
5. The General tab sheet provides read-only information about the WBK module. The Module Name shown here matches the name used by DASyLab. The Secondary Location shown here must match the physical installation location of the WBK module (see Notes Regarding Daisy-Chains).
6. The WBK15 has no adjustable module level settings. Click the <OK> button to exit the dialog.

### Accessing the WBK15's programmable channel features:

1. Double-click on the worksheet's WBK15 AI icon. The Analog Input dialog box will appear.
2. On the Analog Input dialog box, click the <Channel Setup> button. A Channel Setup dialog box will appear to associate 5B modules with the channels of the WBK15. To use a 5B that is not in the supported list, select a module from the list that has a voltage range that is similar to the one you are using.
3. Use the Channel Scaling button to correct for engineering unit conversion discrepancies.





## WBK16 Expansion Module

For proper operation, each WBK16 channel must be tuned through a process of calibration.

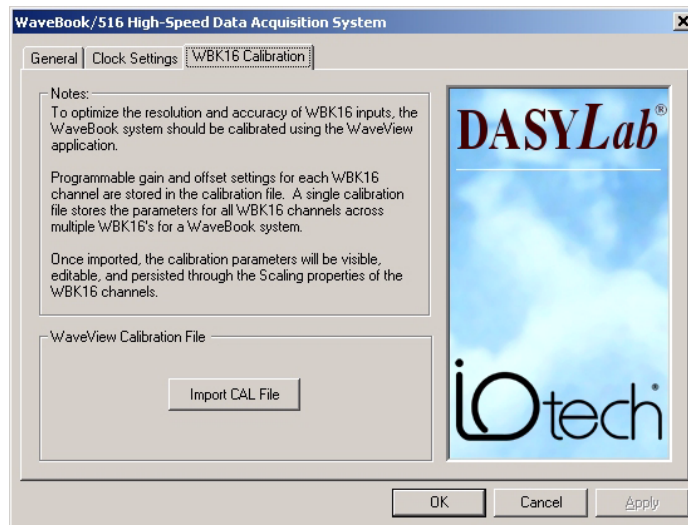
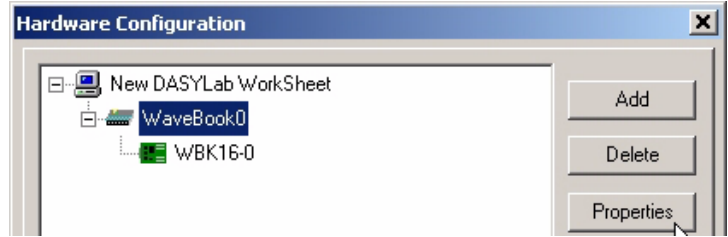
Although the DASyLab interface provides a means to manually setup the parameters of each WBK16 channel, it is highly recommended that WaveView be used to calibrate the WBK16 channels using its automated calibration feature.

During the calibration process, WaveView generates a calibration file that DASyLab can use to setup all of the channels.

**To perform a Shunt Calibration, WaveView must be used. For instructions on using WaveView, refer to the WaveBook User's Manual.**

To Import a WaveView Generated Calibration file into DASyLab, follow the steps below:

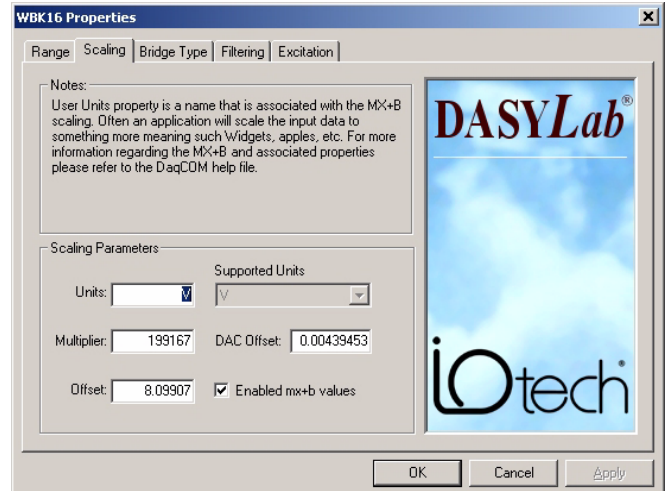
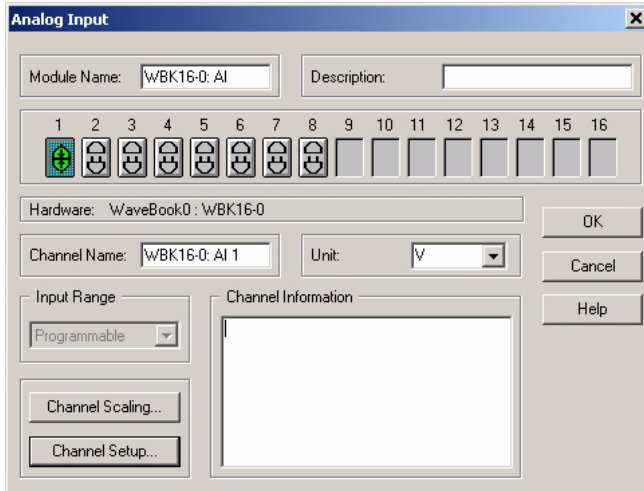
1. Open the Hardware Configuration dialog box.
2. Single-click on the WaveBook icon in the device tree list to which the WBK16 is attached.
3. In the Hardware Configuration dialog box, click on the <Properties> button. The WaveBook Configuration dialog box will appear.
4. If the WaveBook has any WBK16's attached, the WBK16 Calibration property page will be available. A single calibration file contains the calibration parameters for all WBK16's (up to eight) attached to a WaveBook.
5. Click the <Import CAL File> button to select a previously created WaveView calibration file name, then click the <OK> button.



6. Imported CAL File parameters are now stored inside the properties of each WBK16 channel attached to this WaveBook. See accessing channel properties in the next section.

## To access WBK16's programmable channel features:

1. Double-click on the worksheet's WBK16 AI icon. The Analog Input dialog box will appear.
2. On the Analog Input dialog box, click the <Channel Setup> button. A Channel Setup dialog box will appear with Filter and Current Source options. If you do not want to use the calibration file that was created by WaveView, these dialogs provides the ability to do a Name Plate calibration. With Name Plate calibration, you manually set each of the channel's programmable parameters including: \* engineering units \* conversion factors \* excitation voltage \* bridge configuration \* software voltage range \* offset voltage. If you have completed the Import CAL File steps previously, these dialogs will display the calibration parameters imported for this particular channel.
3. Use the Channel Scaling button to correct for engineering unit conversion discrepancies.



## WBK17 Expansion Module

Settings with module wide scope are accessed through the Hardware Configuration dialog in all WBK modules. To access the WBK17's module level configuration follow these steps:

1. Open the Hardware Configuration dialog box. This is accessed through the Experiment | Hardware Setup menu in DASyLab.
2. Single-click on the WBK17 icon to select the module in the device hardware tree view.
3. Single-click on the <Properties> button.
4. The WBK17's Properties dialog pages will appear.
5. The General tab sheet provides read-only information about the WBK module. The Module Name shown here matches the name used by DASyLab. The Secondary Location shown here must match the physical installation location of the WBK module (see Notes Regarding Daisy-Chains).
6. The WBK17 has no adjustable module level settings. Click the <OK> button to exit the dialog.

### Accessing the WBK17's programmable channel features:

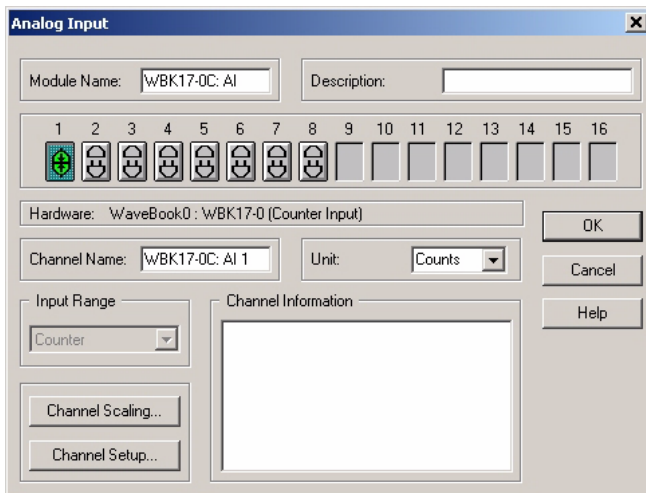
The WBK17 analog input path following the input filter stage splits, sending the input signal to both the counter comparator circuit and onto the WaveBook's analog expansion port. This allows both the input waveform (as it appears at the comparator), and the counter to be scanned simultaneously. This feature makes observing effects of different comparator switching thresholds possible. To support the WBK17 in DASyLab, two AI modules are created for each WBK17 installed.

- An AI module representing the voltage input channels for the WBK17.
- An AI module representing the counter channels for the WBK17.



The WBK17 voltage AI module has no programmable settings. To access the access WBK17's numerous programmable counter input features

1. Double-click on the worksheet's WBK17 'C' AI icon. The Analog Input dialog box will appear which represents the counters of the WBK17.
2. On the Analog Input dialog box, click the <Channel Setup> button.
3. On the Analog Input dialog box, click the <Channel Setup> button.



## WBK18 Expansion Module

Settings with module wide scope are accessed through the Hardware Configuration dialog in all WBK modules. To access the WBK18's module level configuration follow these steps:

1. Open the Hardware Configuration dialog box. This is accessed through the Experiment / Hardware Setup menu in DASyLab.
2. Single-click on the WBK18 icon to select the module in the device hardware tree view.
3. Single-click on the <Properties> button.
4. The WBK18 Properties dialog pages will appear.
5. The General tab sheet provides read-only information about the WBK module. The Module Name shown here matches the name used by DASyLab. The Secondary Location shown here must match the physical installation location of the WBK module (see Notes Regarding Daisy-Chains).
6. The WBK18's excitation source waveform output is configurable through settings on the Excitation Source tab sheet.
7. WBK18 channels are equipped with fault and over-range detection circuits. These hardware status fields may be checked through the Status Detection tab sheet.

### Accessing the WBK18's programmable channel features:

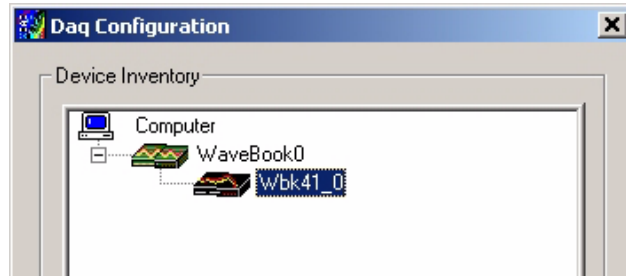
1. Double-click on the worksheet's WBK18 AI icon.
2. The Analog Input dialog box will appear. On the Analog Input dialog box, click the <Channel Setup> button. A Channel Setup dialog box will appear with Filter and Current Source options.
3. If you desire to set a hardware-to-sensor scaling factor, click the <Channel Scaling> button. This feature provides a means of converting the incoming voltages to desired engineering units. Note that this function can also be accomplished using DASyLab's scaling module.



## WBK40/41 Expansion Module

The WBK40 and WBK41 have different hardware architecture than the standard WBK modules (WBK10, 14,15,16,17, 18). The WBK40 and WBK41 attaches to any one of three DB25 parallel expansion ports on a WaveBook/516E, instead of the expansion control and expansion signal ports which other WBK modules use.

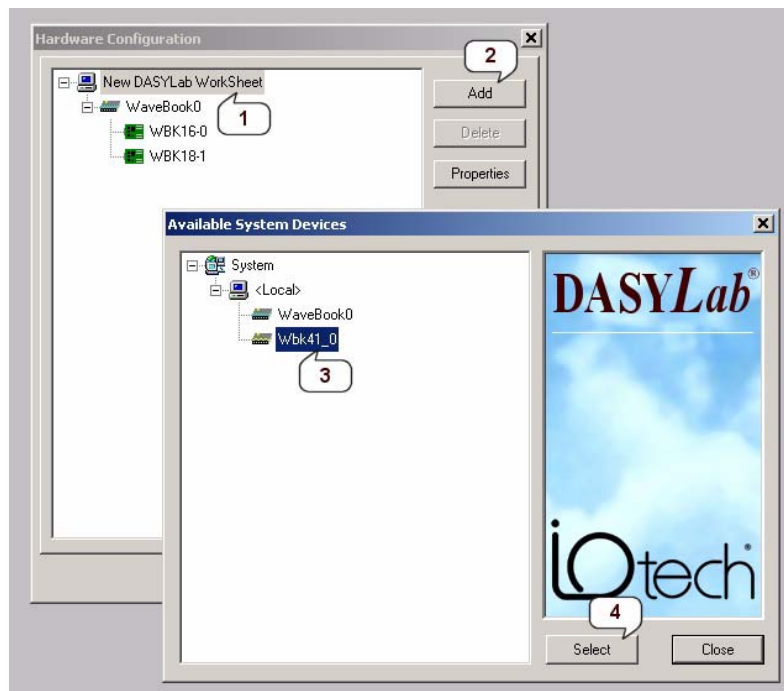
To install a WBK expansion on one of the WaveBook's DB25 parallel expansion ports, use the control panel applet to attach the WBK41 as a child device onto the parent WaveBook0, as shown below.



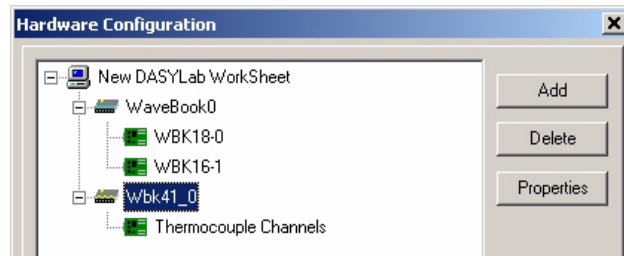
## Configuring a WBK40/41 for use inside DASyLab

Perform the installation sequence similar to adding a main device unit.

- 1) Select the top level tree node [from the configuration tree].
- 2) Click on the <Add> button.
- 3) Select the WBK40/41 from the list of available hardware devices (list matches hardware installed in the control panel).
- 4) Click the <Select> button.

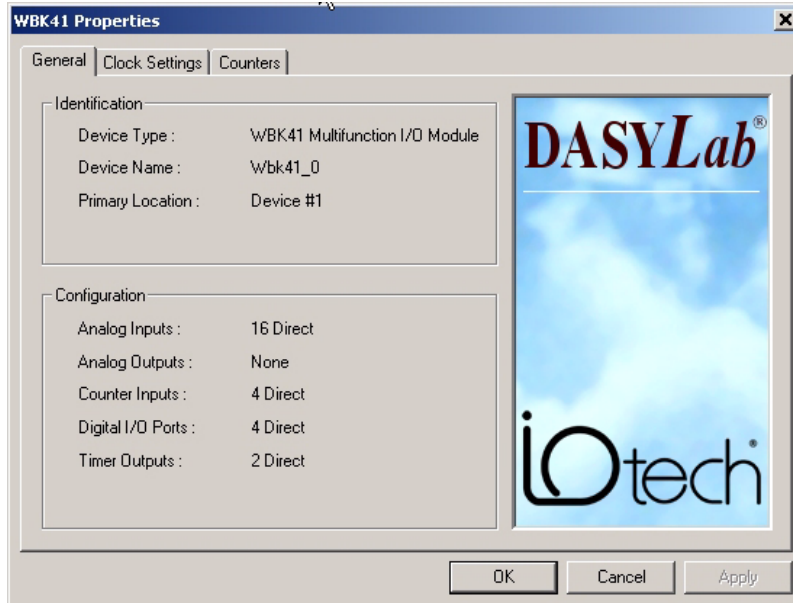


**WBK40/41 Installation Process**

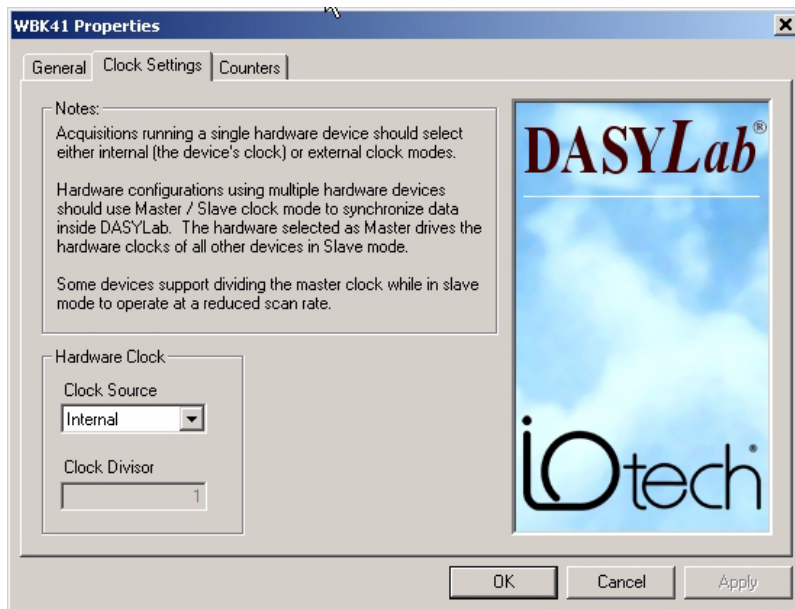


Settings with module wide scope are accessed through the Hardware Configuration dialog in all WBK modules. To access the WBK40/41's module level configuration follow these steps:

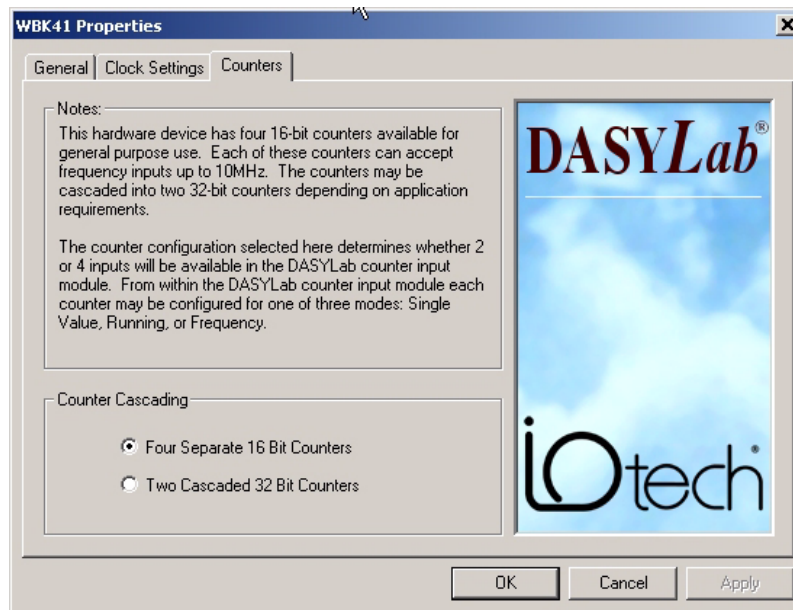
1. Open the Hardware Configuration dialog box. This is accessed through the Experiment | Hardware Setup menu in DASYLab.
2. Single-click on the WBK41 icon to select the module in the device hardware tree view. (see following figure, left-hand side)..
3. Single-click on the <Properties> button.
4. The WBK41 Properties dialog pages will appear. (following figure, right-hand image).
5. The General tab sheet provides read-only information about the WBK module. The Module Name shown here matches the name used by DASYLab.



6. Use the parameters located in the Clock Settings tab sheet to configure the hardware clock synchronization mode. See the multiple device section for more information.



7. Use the Counters tab sheet to configure mode of the built in counters on the WBK40/41. These counters may be configured as either four 16-bit counter, or two 32-bit counters.



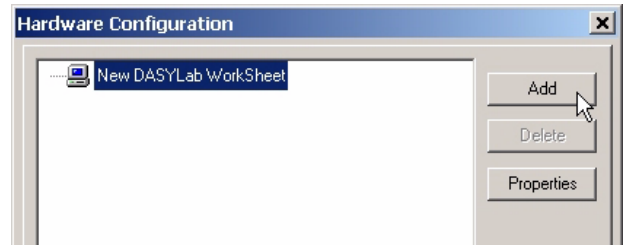
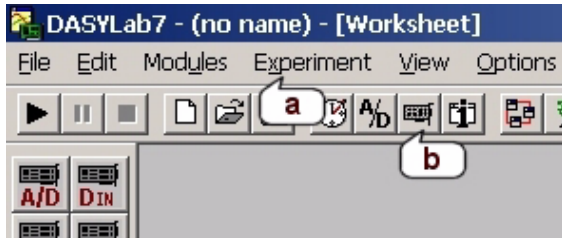
### Accessing the WBK40/41's programmable channel features:

1. Double-click on the worksheet's WBK41 AI icon. The Analog Input dialog box will appear.
2. On the Analog Input dialog box, click the <Channel Setup> button. The WBK40/41 Thermocouple selection dialog box will appear.





# Tutorial - Using a WaveBook & WBK41



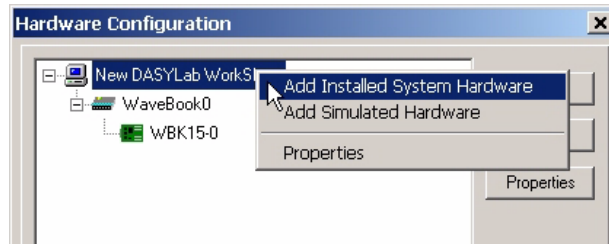
1. Open the hardware configuration dialog.
2. A hardware configuration dialog box similar to the following will appear. On new installations, no hardware will be listed as shown below. Click the "Add" button to open a list of available devices on your system.



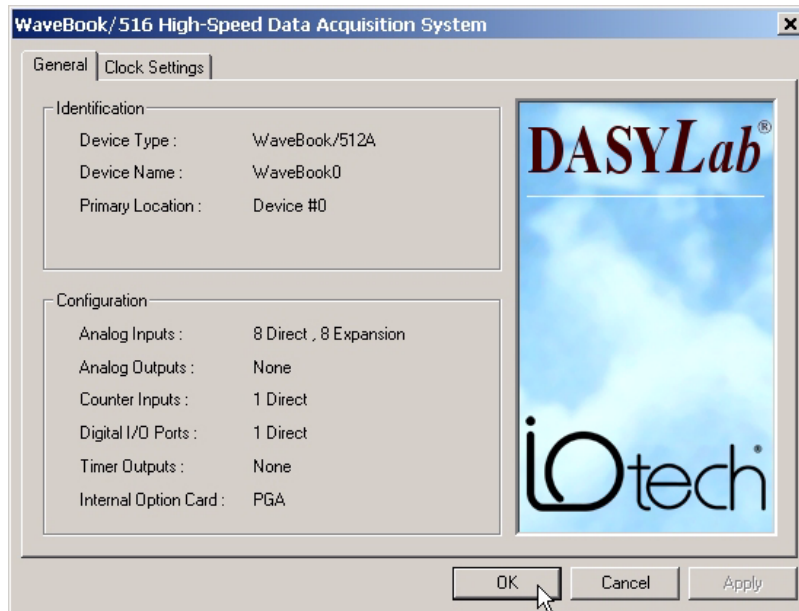
3. The available system devices dialog shown below lists all devices configured via the Daq\* Configuration control panel applet. The names shown here match the Device Name property assigned during installation into the control panel. If both the WaveBook and WBK41 devices are not present in this list, shut down DASyLab, run the Daq\* Configuration applet, and add the devices now. Once both have been installed into the control panel restart DASyLab and continue. Select the WaveBook0 (name may vary) device to use inside DASyLab from the list and click Select.



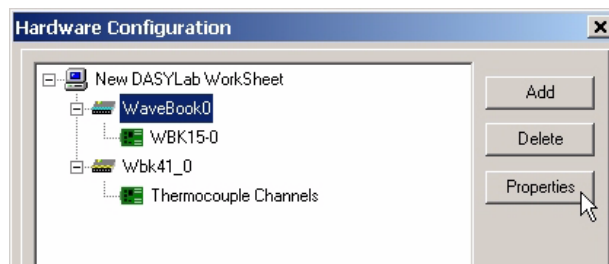
- The DASyLab IOtech hardware configuration dialog is updated with the device selected. In the case of a WaveBook device, as in this example, any attached and active WBK expansion modules will also be detected. All hardware configuration functions are available through the three function buttons are also available via right click popup menus. To add the WBK41 device to DASyLab for this tutorial, right click on the top level worksheet node and select "Add Installed System Hardware" from the popup menu.



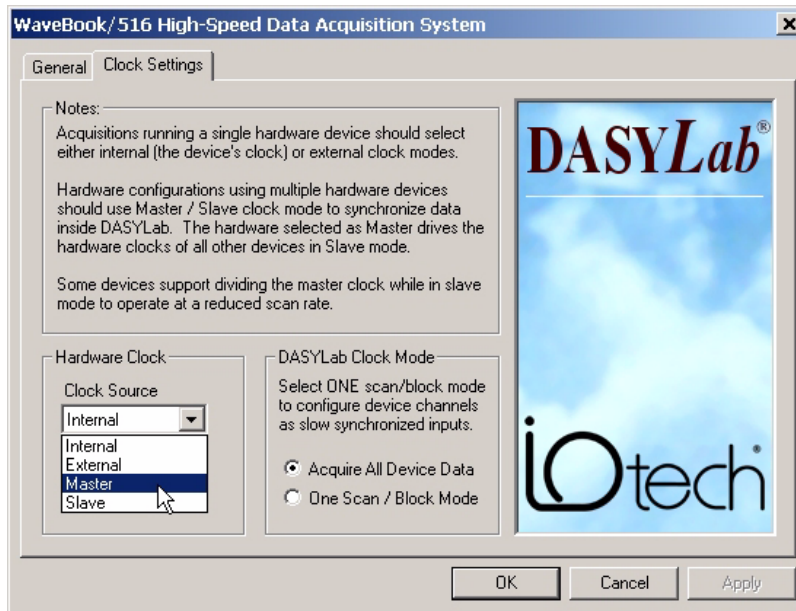
- The available system devices dialog shown below lists all devices configured via the Daq\* Configuration control panel applet will appear again. Select the WBK41 device to use inside DASyLab from the list and click Select.



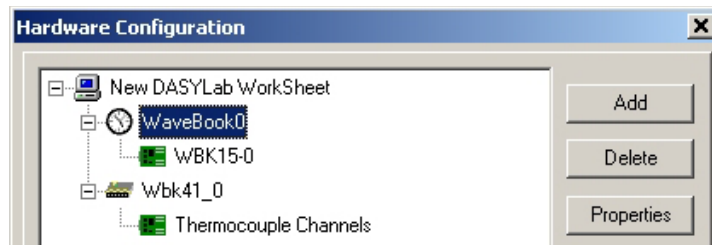
- The DASyLab IOtech hardware configuration dialog is updated with the second device selected. Now to configure the devices for use inside DASyLab select the device node from the hardware configuration tree view and click Properties. Each hardware device will have property sheets to configure parameters which apply to the main hardware device.



- All devices have a General tab sheet on their properties page. The General tab sheet is a read only informational page reflecting the device type, name, position, etc. The configuration section of the General tab provides an overview of all hardware attached to this device. It is updated any time an expansion device is added/removed.



- This tutorial example goal is to configure a two device system. To ensure data synchronization between devices, one of the devices needs to be selected as the clock master. Select "Master" from the list for this device.
- The icon in the hardware configuration tree is updated to indicate this device as the master clock.



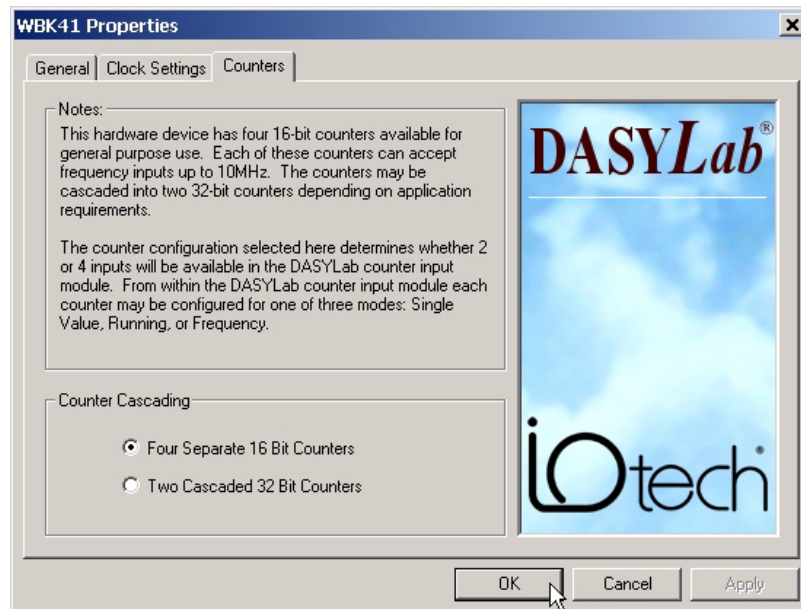
- Open the properties page of the WBK41. As mentioned before, all devices have a General information tab sheet, as shown below for the WBK41.



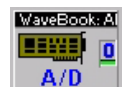
11. The WBK41's clock settings tab sheet below will show this device is configured for Slave clock mode, since the WaveBook was selected as the Master clock. To ensure proper data synchronization in multi-device mode, one device should be selected as Master and all others as Slaves.



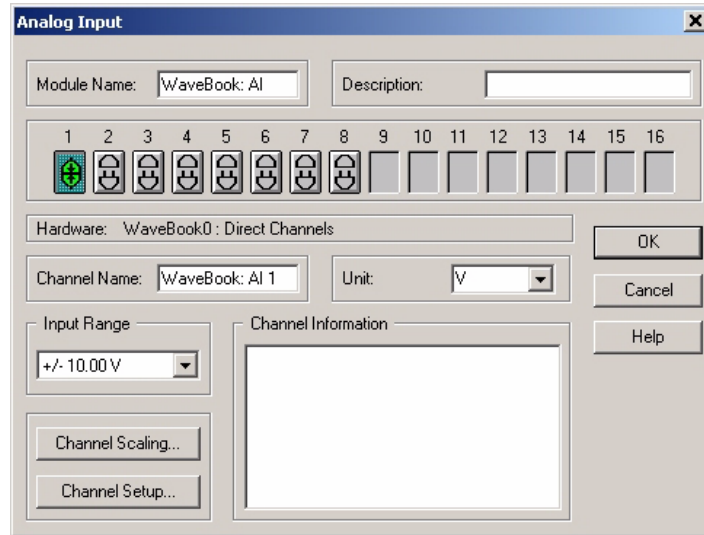
12. If a device has additional programmable features, they are available as additional tab sheets in the device property page. In the case of the WBK41, the counters can be configured for either 16 or 32 bit mode counters.



13. Channel parameters for both the WaveBook and WBK41 may be set by once the A/D object icon is placed onto the DASYLab worksheet. Double click the A/D icon.

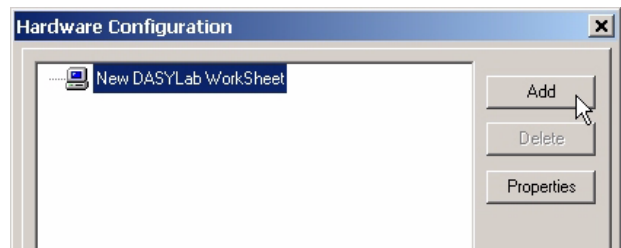
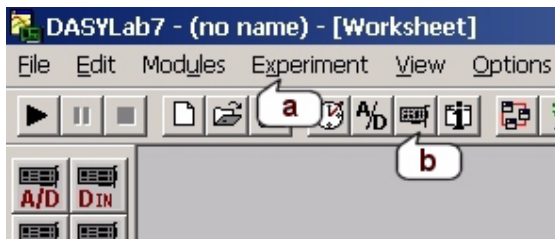


14. From the Analog Input configuration dialog click the <Channel Setup> button.



15. Channel and module setup vary depending upon hardware installed.

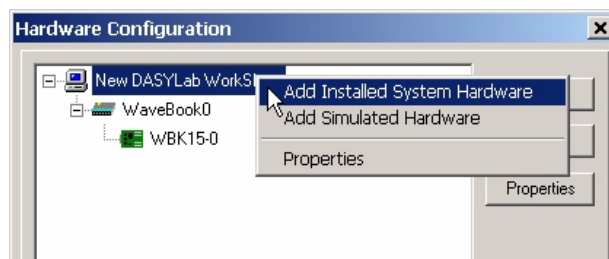
# Tutorial - Using Multiple WaveBooks



1. Open the hardware configuration dialog.
2. A hardware configuration dialog box similar to the following will appear. On new installations, no hardware will be listed as shown below. Click the "Add" button to open a list of available devices on your system.
3. The available system devices dialog shown below lists all devices configured via the Daq\* Configuration control panel applet. The names shown here match the Device Name property assigned during installation into the control panel. If all WaveBook devices are not present in this list, shut down DASyLab, run the Daq\* Configuration applet, and add the devices now. Once both have been installed into the control panel restart DASyLab and continue.
4. Select the WaveBook0 (name may vary) device to use inside DASyLab from the list and click **Select**.



5. The DASyLab IOtech hardware configuration dialog is updated with the device selected. In the case of a WaveBook device, as in this example, any attached and active WBK expansion modules will also be detected. All hardware configuration functions are available through the three function buttons are also available via right click popup menus. To add the second WaveBook device to DASyLab for this tutorial, right click on the top level worksheet node and select "Add Installed System Hardware" from the popup menu.



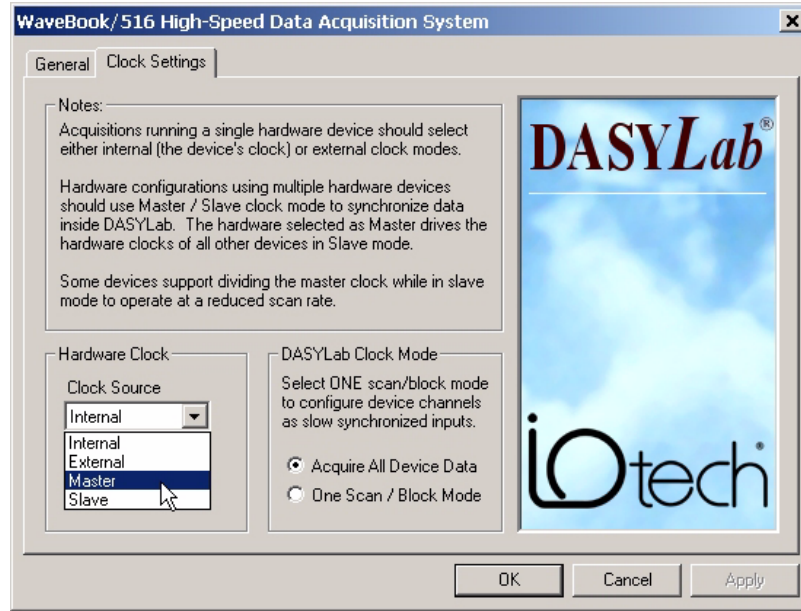
- The available system devices dialog shown below lists all devices configured via the Daq\* Configuration control panel applet will appear again. Select the WaveBook1 device to use inside DASyLab from the list and click <Select>.



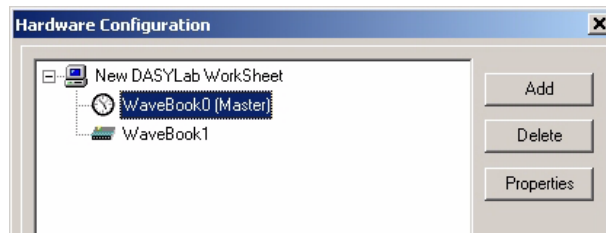
- Now that both WaveBooks have been installed, open the property pages dialog for WaveBook0.
- All devices have a General tab sheet on their properties page. The General tab sheet is a read only informational page reflecting the device type, name, position, etc. The configuration section of the General tab provides an overview of all hardware attached to this device. It is updated any time an expansion device is added/removed.



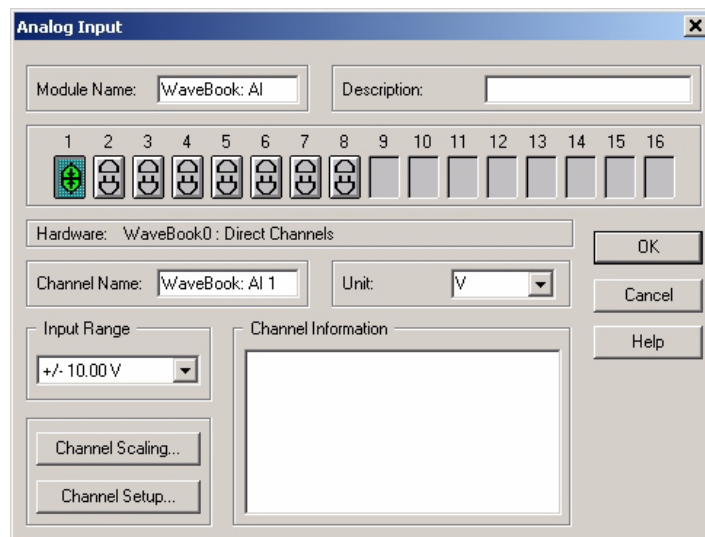
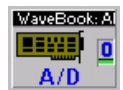
- This tutorial example goal is to configure a two device system. To ensure data synchronization between devices, one of the devices needs to be selected as the clock master. Select "Master" from the list for this device.



- Upon selecting a device to serve as the **Master** clock source, the clock sources of all other devices are automatically updated to **Slave** mode. The Hardware Configuration tree view reflects which device is serving as the master by replacing it's hardware icon with a clock.



- Channel parameters for both the WaveBook and WBK41 may be set by once the A/D object icon is placed onto the DASYLab worksheet. Double click the A/D icon.
- From the Analog Input configuration dialog click the <Channel Setup> button.



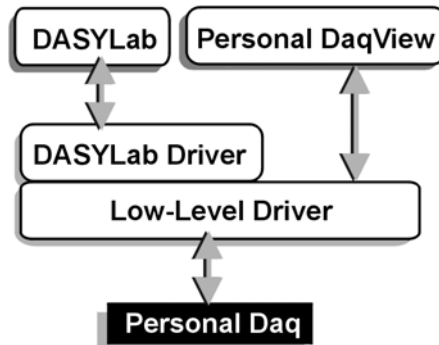
- Channel and module setup vary depending upon hardware installed.



*Install DASYSLab ..... 3-1*

*Install Low-Level Hardware Driver ..... 3-2*

*Configure Personal Daq ..... 3-4*



*Software Support Structure*



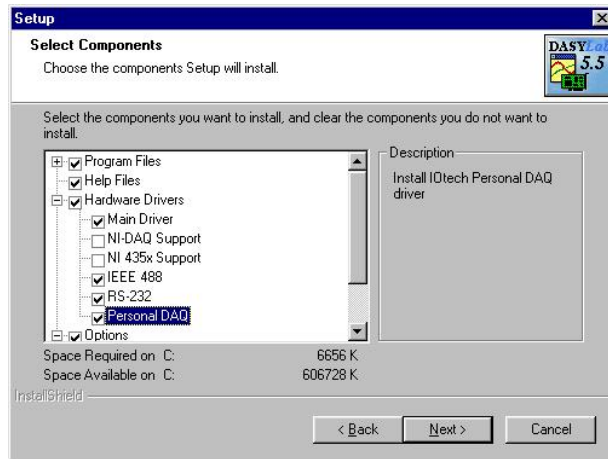
Simultaneous use of a Personal Daq and a WaveBook, DaqBook, or DaqBoard is not recommended. During the Personal Daq’s calibration cycle, other data acquisition products will cease operation, causing gaps in the collected data and potential buffer overruns.

---

## Install DASYSLab

1. Launch *DASYSLab* installation from the **DASYSLab CD**. Note that the CD should *auto-start*. If the CD does not auto-start, run the CD **start.exe** from the Windows Desktop.
2. Select "Installation," then Full Version." The actual installation process begins.
3. When prompted for your *name, company* and *serial number*, enter the requested data. Obtain the serial number from the CD jacket. Keep the number in a safe place for future installations and upgrades.
4. When prompted for the installation directory and program folder, use the default selection, or choose another. We recommend that the default directory and location be used.
5. When prompted for **Setup Type**, choose from the available options. We recommend that you select *Typical*.
6. The **Personal Daq hardware driver is already selected by default**; therefore, when prompted to select the **Hardware Driver** you can click <Next>.

**Note:** You can select other drivers [for another supported hardware you have] at this time.



*The Personal Daq Hardware Driver is Automatically Selected by Default  
You will only see this screen if you do a “Custom” install.*



**Tip** Make sure a check mark appears next to your selection(s). Choices that are merely highlighted and not checked will not be installed.

**Note:** If you allowed the IEEE488 (GPIB) drivers to be installed, you will be able to select the vendor.

A final screen displays the selected options about to be installed. Be sure the report matches your intended choices. Step back to modify settings if needed.

**Note:** After *software installation* is complete, you may be required to restart Windows.  
After restart, continue with the following section, *Hardware Driver installation*.

---

## Install Low-Level Hardware Driver

If the low-level hardware drivers for your device are not installed, or if you have received a new IOtech Data Acquisition CD, follow these steps.



**Note!** Both the low-level drivers, installed from the Data Acquisition CD, and the DASYSLab drivers, installed from the DASYSLab CD, are required for DASYSLab operation.

**Note:** The installation will automatically perform version verification to ensure that only newer support is installed.

1. Place the data acquisition CD into the CD-ROM drive. Wait for the PC to auto-run the CD. This may take a few moments, depending on your PC. If the CD does not auto-run, use the Desktop's Start/Run/Browse feature to select and run **Setup.exe**.
2. After the intro screen appears, click **<Enter Setup>**.
3. After accepting the licensing agreement, select Personal Daq Systems from the Hardware Setup screen. Then click **<Next>**.
4. Select **DASYSLab Drivers**.
5. Click the **<Install>** button; and follow the screen prompts.



**Use Personal DaqView to verify connections and configurations. This use of Personal DaqView can be very beneficial, especially in applications making use of expansion modules.**

Verify your hardware installation using the Resource Test in the *Daq\* Configuration Control Panel Applet*. Refer to the data acquisition user's manual for instructions on using the applet and configuring device names.

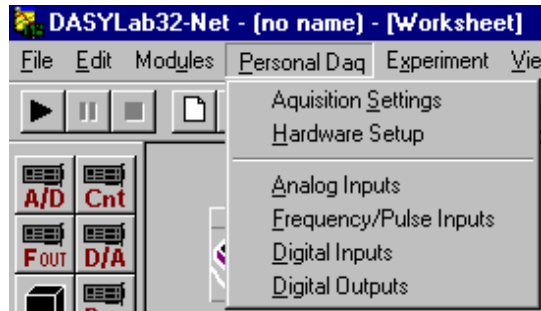


*Selecting the Daq\* Configuration Control Panel Applet*

**Note:** You can download the latest hardware and DASyLab drives from our web site at [www.iotech.com](http://www.iotech.com).

## Configure Personal Daq

The following can be selected from within **DASYLab's Personal Daq pull-down menu**: Acquisition Settings, Hardware Setup, Analog Inputs, Frequency/Pulse Inputs, Digital Inputs, and Digital Outputs (see following figure).

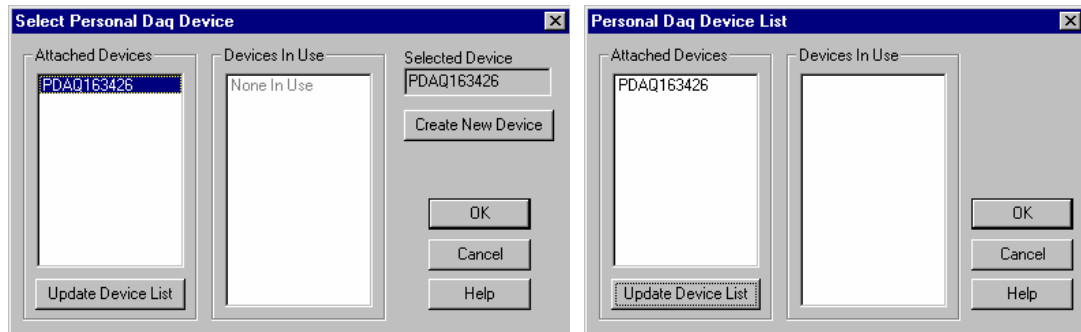


*DASYLab's Personal Daq Pull-down Menu*

**Note:** Selecting Analog Inputs, Frequency/Pulse Inputs, Digital Inputs, or Digital Outputs causes the associated icon to appear on your worksheet. *Double-clicking* on a module icon [after it is added to a worksheet] reveals channel configuration options that are available in Personal DaqView, such as channel integration time and signal range.



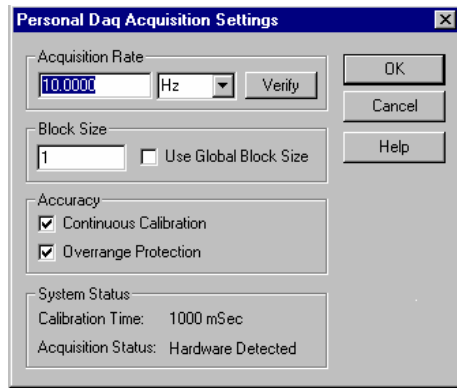
**You can verify that the DASYLab software is communicating with the Personal Daq by locating the device serial number in *Hardware Setup* (in the Personal Daq menu). See following figures.**



*Checking the Personal Daq Device Number*



**DASYLab does not support Personal Daq's digital output capabilities unless you have firmware revision 1.9 (or greater) and have installed Personal DaqView 1.4 (or greater). Confirm firmware revision by using personal DaqView active devices, right click on Pdaq device. Contact factory if firmware upgrade is needed.**



*Personal Daq Acquisition Settings*

DASYLab's Personal Daq menu includes an *Acquisition Settings* dialog box.

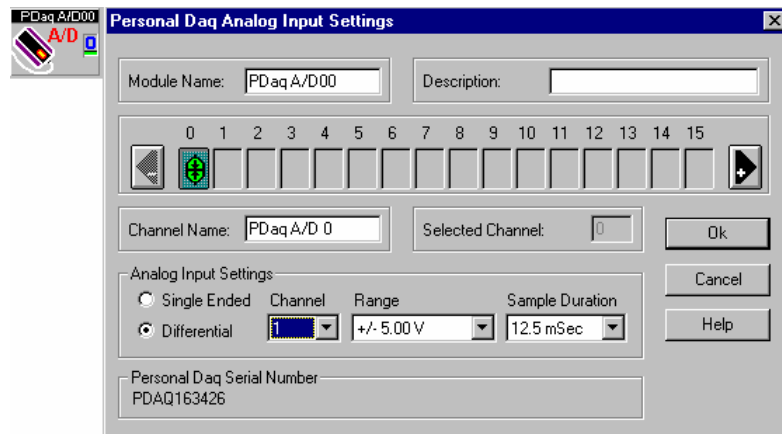
The dialog box includes panels for setting the Acquisition Rate, Block Size, and Accuracy (Continuous Calibration and/or Overrange Protection).

The dialog box also includes a system Status panel.



**When using Personal Daq you should use the Personal Daq Acquisition Settings window to set the Acquisition Rate and Block Size (see the preceding figure). You should not use the Experiment Setup window to do this, as these two parameter values are not generally coordinated between windows. An exception is that Block Sizes will be coordinated if the checkbox for “Use Global Block Size” is checked.**

A screen similar to that in the following figure appears after selecting Analog Inputs and *double-clicking* on the module icon [after it is added to a worksheet]. Notice that the device serial number appears on this screen.



*Personal Daq Analog Input Settings*

In the screen (see preceding figure) you must assign physical channels on the Personal Daq [and on PDQ1 and PDQ2, if present] to virtual channels in the A/D module. This is accomplished by highlighting each of the virtual channels in the 0 to 15 channel bar and then defining channel parameters as follows:

- Select Single-Ended or Differential
- Select the Channel; this is the *physical* channel number. Guidelines and examples follow the bulleted list.
- Select the Range
- Select the Sample Duration.

Use the following guidelines when selecting a physical channel number.

- Make sure that the physical channel that you are assigning exists in your hardware configuration. For instance, it would be a mistake to assign channel 6 for a Personal Daq/55, as that product has no channel 6. If a nonexistent channel is assigned DASyLab will display an error message when you try running the worksheet.
- During the assignment process, both differential and single-ended channels can be used.
- You may skip physical channels during the assignment process. However, you must assign physical channels to virtual ones in monotonic ascending order. If you fail to do this the driver will rearrange them, resulting in virtual channels with different information than that which is expected. Examples of good and bad assignments follow.

**Examples of Good and Bad Channel Assignments**

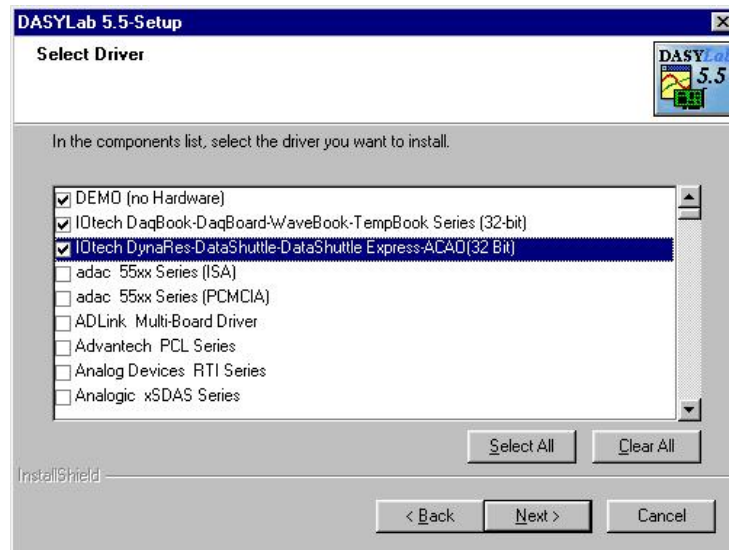
<b>Good</b>						
Virtual Channels	0	1	2	3	4	5
Physical Channels	1	2L	3	4	11	12L

<b>Bad</b>						
Virtual Channels	0	1	2	3	4	5
Physical Channels	1	2L	5H	13H	4L	5L
<i>In this case the driver will rearrange the physical channels as follows:</i>						
Virtual Channels	0	1	2	3	4	5
Physical Channels	1	2L	4L	5L	5H	13H

- Install DASyLab ..... 4-1
- Workbench Notes ..... 4-2
- Using Experiment / Hardware Setup ..... 4-4
- Configuring ACAO Boards ..... 4-6

## Install DASyLab

1. Launch DASyLab installation from the **DASyLab CD**. Note that the CD should *auto-start*. If the CD does not auto-start, run the CD **start.exe** from the Windows Desktop.
2. Select "Installation," then "Full Version." The actual installation process begins.
3. When prompted for your *name, company, and serial number*, enter the requested data. Obtain the serial number from the CD jacket. Keep the number in a safe place for future installations and upgrades.
4. When prompted for the installation directory and program folder, use the default selection, or choose another. We recommend that the default directory and location be used.
5. When prompted for **Setup Type**, choose from the available options. We recommend that you select *Typical*.
6. When prompted to select the Hardware Driver, check the entry: **IOtech DynaRes-DataShuttle Express-ACAO (32-Bit)**. You can select other drivers [for any other supported hardware you have] at this time.



Selecting: IOtech DynaRes-DataShuttle Express-ACAO(32 Bit)



**Make sure a check mark appears next to your selection(s). Choices that are merely highlighted and not checked will not be installed.**

**Note:** If you allowed the IEEE488 (GPIB) drivers to be installed, you will be able to select the vendor.

A final screen displays the selected options about to be installed. Be sure the report matches your intended choices. Step back to modify settings if needed.

**Note:** After *software installation* is complete, you may be required to restart Windows.

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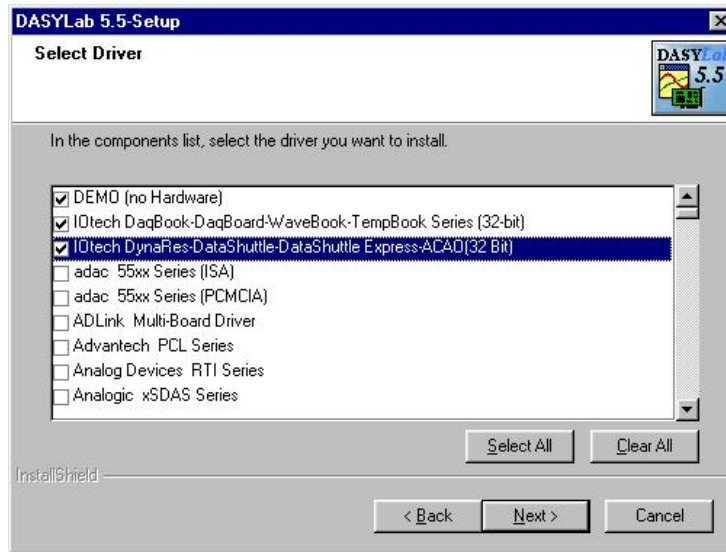
## Workbench Notes

Because Workbench is a *special packaged version of DASyLab*, the drivers are already included in the installation process. There is a second selection for IEEE 488 support in both software packages. This selection is largely irrelevant, unless you have a particular manufacturer's IEEE device.



**If you do not see the “Select Driver” window (see following figure) during the DASyLab installation, you probably selected a demo version of DASyLab for installation. If this is the case, cancel and restart the installation.**

**Note:** Only single-click on the buttons.



**Selecting: IOtech DynaRes-DataShuttle/DataShuttleExpress-ACAO [32-bit]**



After software installation is complete, restart Windows or reboot the computer.



**There is a driver conflict between QuickLog, or 16-bit Workbench / DASyLab and 32-bit Workbench / DASyLab applications. You can resolve this conflict as described in the following steps.**

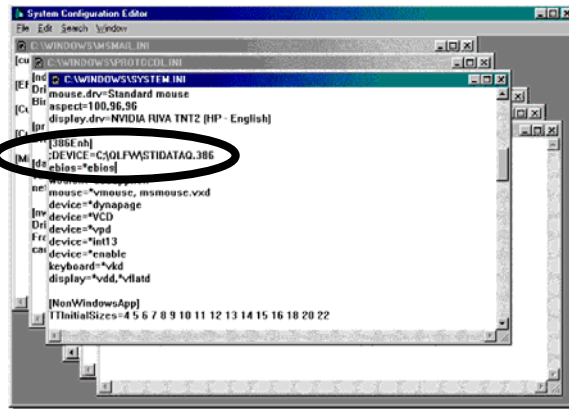
**No driver conflict exists between the 16-bit application and QuickLog. If you have installed DASyLab / Workbench as a 16-bit application, the following steps are not required.**

**To resolve this conflict (32-bit applications only):**

1. Run SYSEDIT.
2. Locate the SYSTEM.INI window.
3. Locate the following:

[ 386Enh ]

[386Enh] DEVICE=C:\QLFW\STIDATAQ.386



*Locating: [386Enh] DEVICE=C:\QLFW\STIDATAQ.386*

4. Comment out the DEVICE line by inserting a semi colon (;) at the beginning of the line.
5. Restart Windows.

**Note:** You will have this conflict, if you previously installed QuickLog, 16-bit DASyLab, or Workbench; or if you accidentally selected "All Drivers" during installation:

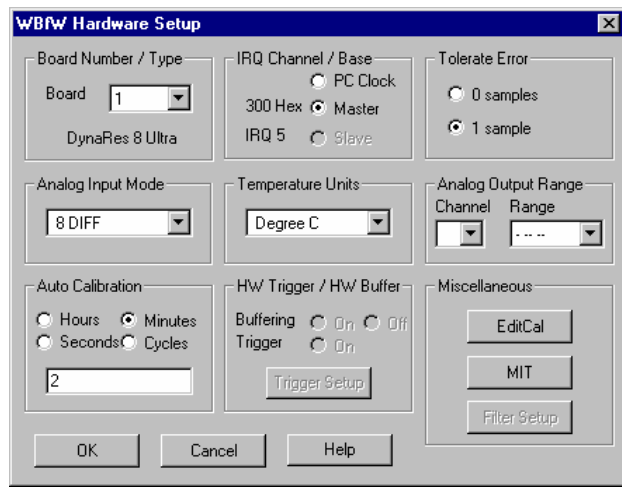
- Start DASyLab
- Open **Experiment / Select Driver**
- Pick correct driver
- Exit DASyLab
- Restart DASyLab

Now communication will exist for the connected Strawberry Tree equipment and 32bit DASyLab.

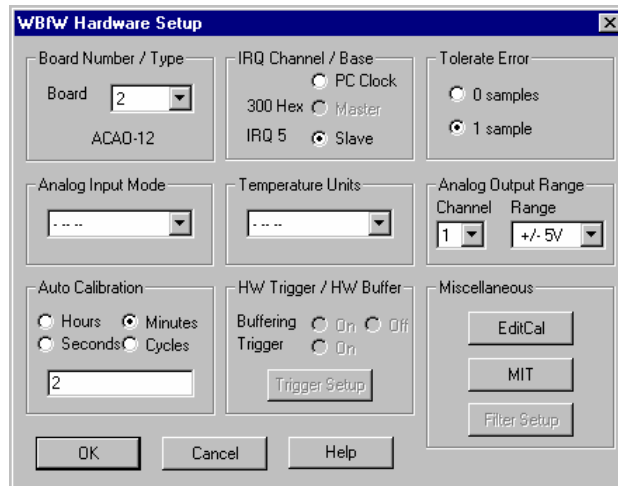
## Using Experiment / Hardware Setup

There is automatic recognition of all connected devices. From WBfW Hardware Setup (see figure at right, and following two figures):

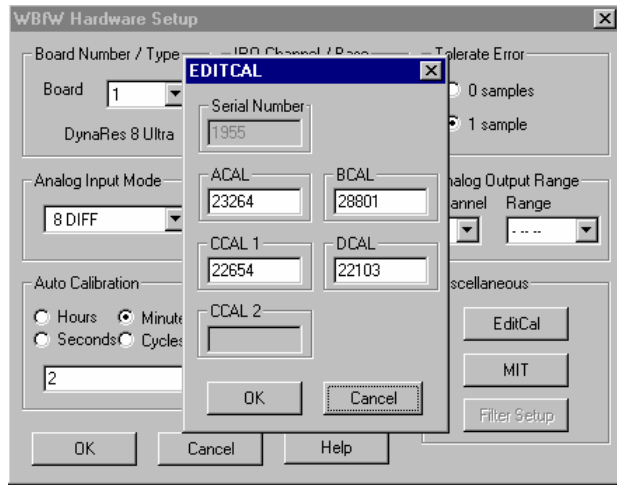
- Select board number
- Set Auto Calibration time. To disable Auto Calibration, set to 0.
- Since Auto Calibration requires 1 minute to complete, only use it for very slow acquisition scan rates.
- Specify analog output voltage ranges where appropriate. If equipment does not have this capability, then this section will be blank.



**WBfW Hardware Setup,  
Board #1, DynaRes 8 Ultra Selected**



**WBfW Hardware Setup,  
Board #2, ACAO-12 Selected**



**Selecting EDITCAL**

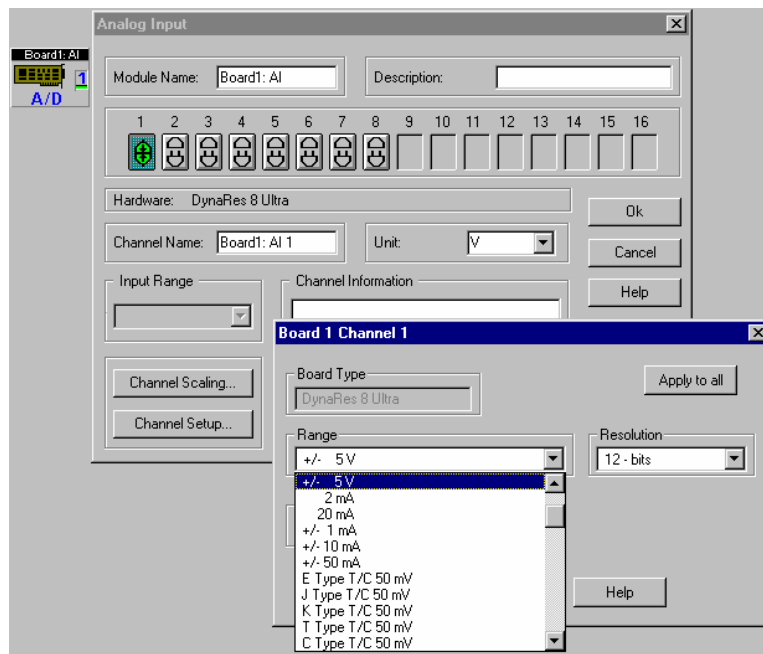
Note that you can run EDITCAL to verify the calibration numbers by comparing the values to those on your device's calibration label. You can also use EDITCAL to alter calibration of channels.

Consult your Data Shuttle/DynaRes manual for detailed information.

After adding an Analog Input or Analog Output module icon to your worksheet; double-click on the icon to access the relevant configuration screen (see following figure).

Clicking the *Channel Setup* button allows you to set signal types for the channels of a specific board.

Clicking the *Channel Scaling* button provides a means of converting signal values to "Engineering Units."



**Analog Input Configuration Screen  
Channel Setup is Selected for Board 1, Channel 1**

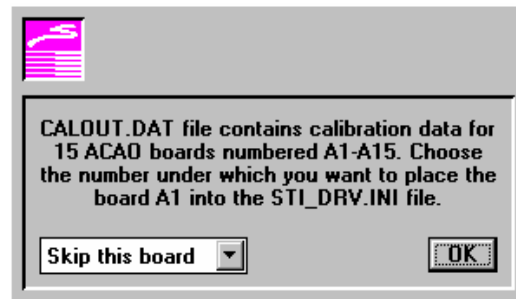
## Configuring ACAO Boards

If you are using the ACAO board you must run a program called "ACAO Calibration Data Processor." This program is included in a *DASYLab* folder and allows configuration of up to 15 ACAO boards. If you find this folder to be missing, notify IOtech's Application Department.

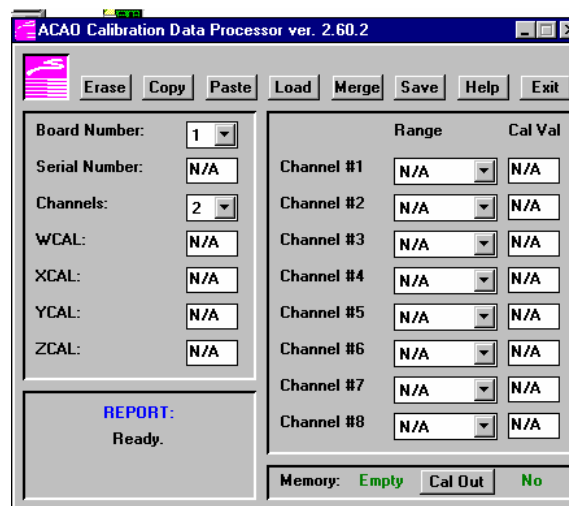
Contact information is included on the front page of this document.

Run the ACAO Calibration program and load the **calout.dat** file. **Note that you must specify the board numbers that match those specified by the hardware switch.** You need to start with board A1 and the lowest ACAO board-number then click <OK>. Proceed to A2 board and the next highest board number until you have accounted for all ACAO boards.

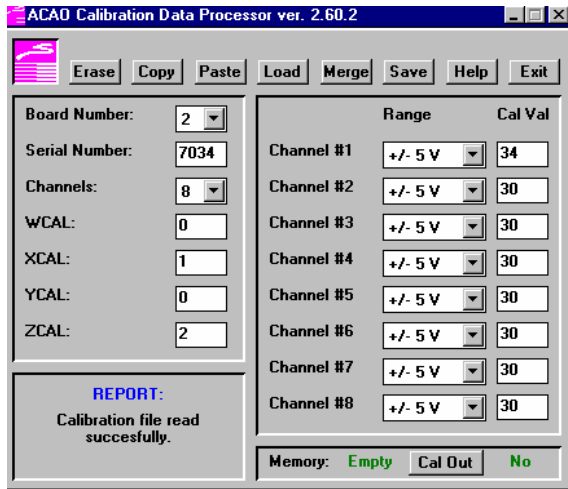
For all unused boards, click **OK** on the drop-down box showing "Skip this board," See the following figure.



*Preparing to Skip an unused Board*



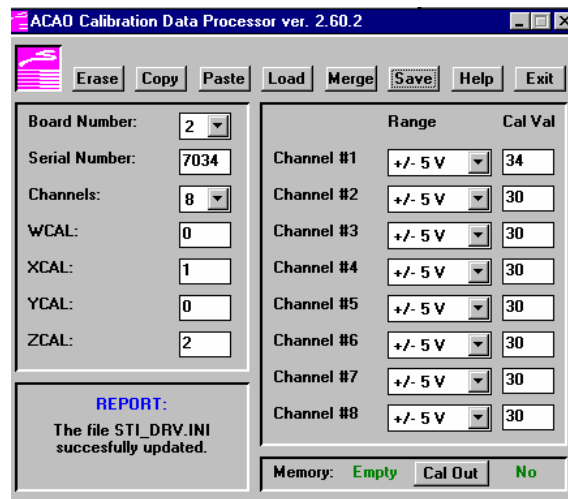
*ACAO Calibration, Board 1 Selected;  
Ready to Enter Constants*



Change the board numbers to match the first ACAO board.

Enter the constants for Range, Cal Val, and the number of channels for the board.

*ACAO Calibration, Board 2 Selected;  
Constants Entered*



Click the <Save> button to update the **STI\_DRV.INI** file.

Repeat these steps for all remaining ACAO boards that you have.

*ACAO Calibration, Board 2 Selected  
Successful File Update\**

\* Note that the STI\_DRV.INI file was successfully updated after clicking <Save>.



**Overview ..... 5-1**

**IOToolKit ..... 5-2**

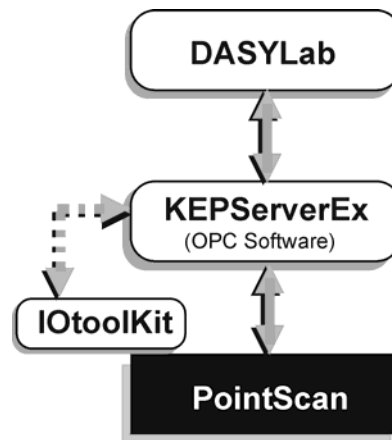
- Install the IOToolKit ..... 5-2
- Reserve Addresses ..... 5-2
- Ethernet Configuration ..... 5-2
- Configure the System via the IOToolKit ..... 5-4

**KEPServerEx ..... 5-5**

- Install the KEPServerEx Software ..... 5-5
- Configure KEPServerEx ..... 5-5

**DASyLab ..... 5-6**

- Install DASyLab ..... 5-6
- Connect DASyLab to the OPC Server ..... 5-7



*Software Support Structure*

---

## Overview

This chapter covers the steps necessary for a successful installation of DASyLab for use in PointScan applications. The chapter sections are presented in chronological order, as indicated in the table of contents above.

In order to complete all steps successfully, you will need the following at, or above, the indicated version level.

- **IOToolKit Installation CD**, version 1.2 (p/n 1075-0601)\*
- **KEPServerEx**, version 4.0 (included on the IOToolKit CD)\*
- **DASyLab Installation CD**, version 6.0 (p/n 472-0606)\*
- **Internet Explorer**, version 5.0\*
- **PointScan/104, PointScan/204, & PointScan/443 Power Supply**

\*The version numbers indicated are the lowest version levels required to ensure a successful installation of DASyLab for PointScan applications.

---

## ***ItoolKit***

### **Install the ItoolKit**

1. Insert the ItoolKit CD (p/n 1075-0601) into the CD drive.

**Note:** The CD should *auto-start*. If the CD does not auto-start, run the CD **start.exe** from the Windows Desktop.

2. Browse to the contents of your CD drive.
3. Open the **IO Tools Install** folder.
4. Click on **setup.exe**.
5. Follow the prompts to complete the installation.
6. From the Windows Start menu select: **Programs**, and then **IO Tools**.  
The program will now load.

### **Reserve Addresses**

After assembling the PointScan hardware, work with your network administrator to reserve a bank of network addresses for:

- the host computer
- the PointScan modules that will be connected to the Ethernet



**You can use a “485 Pass-Through” connection to reduce the required number of addresses. The pass-through allows you to use a single address to connect up to eight PointScan modules to the Ethernet.**

### **Ethernet Configuration**

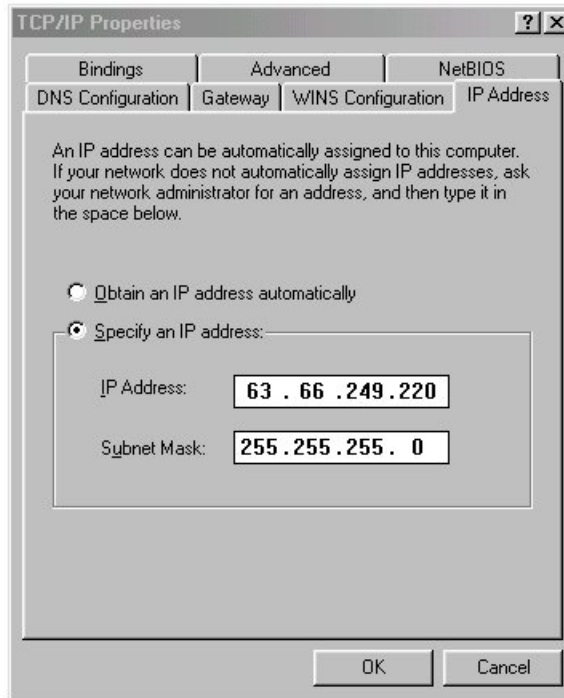
The Ethernet port on your PC must be configured. Windows 98 and higher includes TCP/IP (the networking protocol) for Internet access. Your PC's Ethernet port will be assigned a unique IP address [10.X.Y.Z] used to communicate with the Ethernet-based PointScan/104 module.



## Set-up for Windows9x

Use the below instructions to modify existing TCP/IP settings.

1. Select Start ⇒ Settings ⇒ Control Panel ⇒ Network  
If TCP/IP does not exist in the components window Press Add ⇒ Protocol ⇒ TCP/IP.
2. Double Click on TCP/IP in the components window and select the IP Address tab.
3. Press OK to close the network dialog and reboot your computer if instructed to do so.

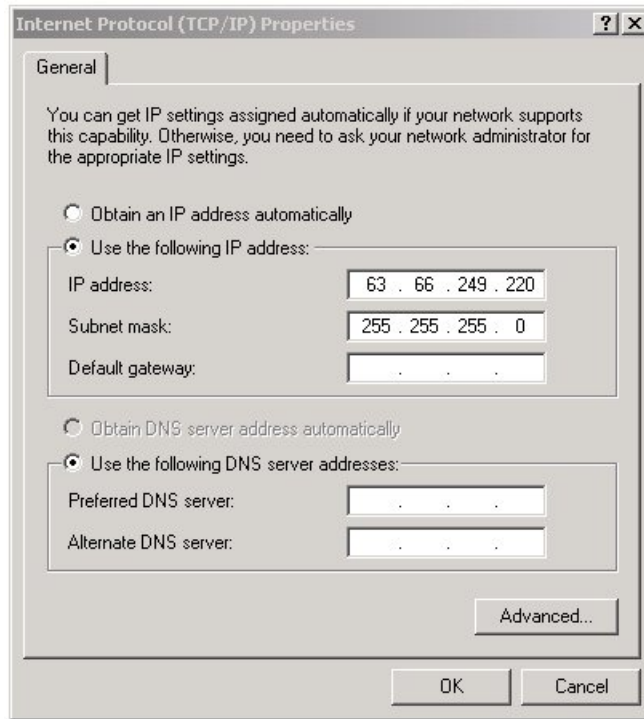


*Win 9x: Example of Setting TCP/IP values*

## Setup for Windows™ 2000

Use the below instructions to modify existing TCP/IP settings.

1. Select Start ⇒ Settings ⇒ Network and Dial-up connections
2. Double Click on Local Area Connection and click Properties.  
If TCP/IP does not exist in the components window press Install ⇒ Protocol ⇒ TCP/IP.
3. Double Click on TCP/IP and fill in the Values and press OK
4. Press OK to close the network dialog and reboot your computer if instructed to do so.



*Windows 2000: Example of Setting TCP/IP values*

## Configure the System via the IToolKit

Use the IToolKit software to perform the system configuration. Instructions are included on the CD (See the following reference note). Configuration includes:

- setting up the IP address for PointScan modules that have a direct Ethernet connection
- setting up the pass through communication protocol to additional devices that are using a 485 pass-through
- naming stations and channel tags
- setting measurement parameters for channels, e.g., integration time and ranges.
- saving the configuration
- verifying system communications



### Reference Note:

Refer to *Getting started with the IToolKit*, located within the *IToolKit Help* document, for instructions related to the above topics.



**For backup purposes, save the settings as a project file.**

---

## KEPServerEx

After completing your work with the IOtoolKit, you will need to install the KEPServerEx OPC Server Software and then configure KEPServerEx. OPC stands for *OLE for Process Control*, where OLE is the acronym for *Object Linking and Embedding*.

The IOtoolKit CD (p/n 1075-0601) includes a free, unlicensed version of the KEPServerEx software, related instructions, and prompts.

**Note:** The free *unlicensed version* of KEPServerEx [included on the IOtoolKit CD] supports up to three hours of operation before it is necessary to re-boot the system. A licensed version of KEPServerEx software, that provides continuous operation, can be purchased through IOtech. Contact information is provided on the cover page of this document.

### Install the KEPServerEx Software

1. Insert the IOtoolKit CD (p/n 1075-0601) into the CD drive.

**Note:** The CD should *auto-start*. If the CD does not auto-start, run the CD **start.exe** from the Windows Desktop.

2. Browse to the contents of your CD drive.
3. Open the **KEPServer** folder.
4. Double click on **disk1**.
5. Click on **setup.exe**.
6. Follow the prompts to complete the installation.
7. From the Windows **Start** menu: select **Programs**, then **KEPServerEX**.  
The program will now load.

### Configure KEPServerEx

KEPServerEx configuration is discussed in help files that are included on the IOtoolKit CD (p/n 1057-0601). Reference notes to those documents are provided below.



**DASYLab can only recognize the *short* data format; thus, KEPServerEx must be configured for *short* data format.**

**The scan rate must be specified for a fixed scan rate, not to transmit data only when a change occurs.**



#### Reference Notes:

Refer to the **KEPServerEx Help** document [located on the IOtoolKit CD] for information regarding how to:

- add station names and channel tag names
- specify device IP addresses and channel Modbus addresses
- prove the IO communication with all devices using the OPC **<QuickClient>** button
- save the configuration for backup purposes

Refer to the **EtherTRAK Help** document [located on the IOtech Toolkit CD] for a list of modbus addresses for each module's channel type. Channel configurations [for specific channels] require that the modbus address and the data format be specified.

After completing the KEPServer configuration, use the OPC **<QuickClient>** button to test all PointScan modules and channel configurations.

## Install DASYLab



**DASYLab software versions that precede 6.0 do not support PointScan products. If your DASYLab version precedes 6.0, please contact [sales@iotech.com](mailto:sales@iotech.com) for upgrade information.**

**For DASYLab to properly install, the host computer must be using *Internet Explorer* version 5.0 or higher.**

Install DASYLab as follows:

1. Launch the DASYLab installation from the **DASYLab CD**.  
**Note:** The CD should *auto-start*. If the CD does not auto-start, run the CD **start.exe** from the Windows Desktop.
2. Select "Installation," then "Full Version." The actual installation process will begin.
3. When prompted for your *name, company* and *serial number*, enter the requested data. Obtain the serial number from the CD jacket.



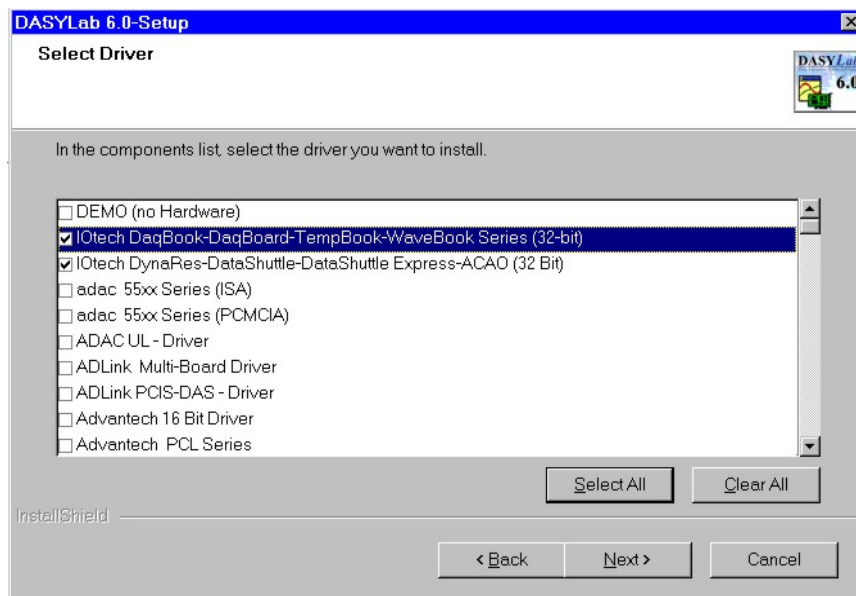
**Keep the serial number in a safe place. You may need to reference it for future installations and upgrades.**

4. When prompted for the installation directory and program folder, you can use the default selection, or choose another. We recommend using the default.
5. When prompted for **Setup Type**, choose from the available options. We recommend that you select **Typical**.
6. Select the applicable hardware drivers when prompted. See the following note and figure.



**There are no PointScan related drivers to select. The drivers that are selected in step 6 are for components that are in addition to PointScan.**

**Be sure to place a check mark next to each of your selections. Choices that are not checked will not be installed, even if they are highlighted.**



*Selecting Drivers in DASYLab Setup*

A screen displays the selected options. If needed, use the <Back> button and make the appropriate changes.



**In the case of IEEE488 (GPIB) drivers, be sure that the vendor identity is correct. Windows NT/2000 may require installation of DataSocket support after installation of DASyLab. You will receive a message prompt, should installation of DataSocket support be required.**

## Connect DASyLab to the OPC Server



**Before connecting DASyLab to the OPC Server, verify that the OPC server is receiving valid readings from the PointScan device.**

Complete the following steps to connect DASyLab to the server.

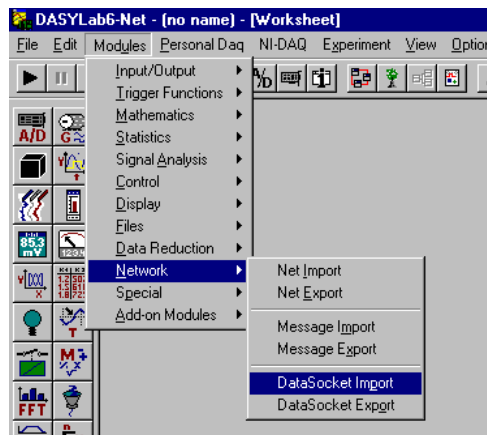
1. From a DASyLab worksheet, access the **DataSocket Import Setup** screen by navigating as follows from the toolbar (see first figure):

⇒ **Modules** [pull-down menu]

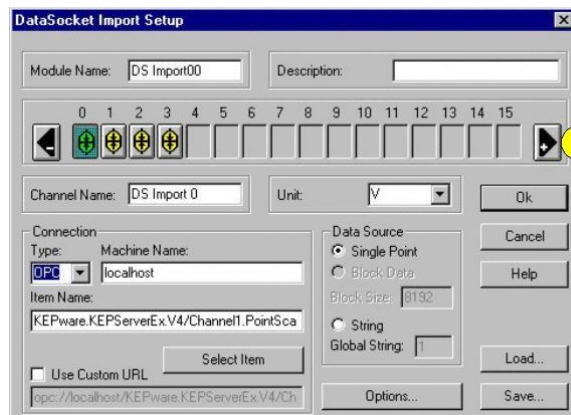
⇒ **Network**

⇒ **DataSocket Import** (left-click to bring up a *DataSocket Import Icon*)

Double-click on the *DataSocket Import Icon* (not shown) to open the **DataSocket Import Setup** dialog box (see second figure).



*Selecting DataSocket Import*

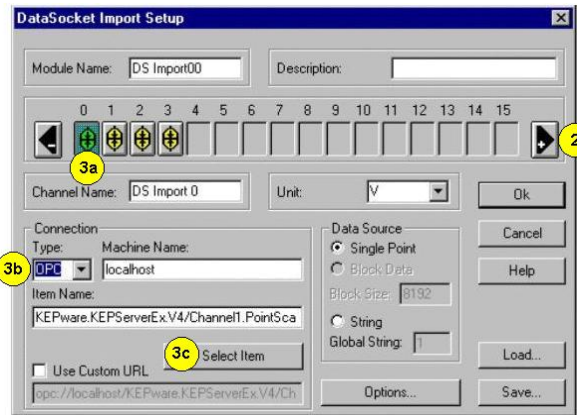


*DataSocket Import Setup*

2. Click on the triangular add button [item 2 in the above figure] to add the desired number of channels. Each click of the button will sequentially place a *socket image* beneath a channel. In the preceding figure *socket images* can be seen for channels 0, 1, 2, and 3.

**Note:** If your system has more than 16 channels, you will need to put an additional *DataSocket Import* module on your worksheet.

3. Configure a channel; steps 3(a) through (f).



*DataSocket Import Setup*

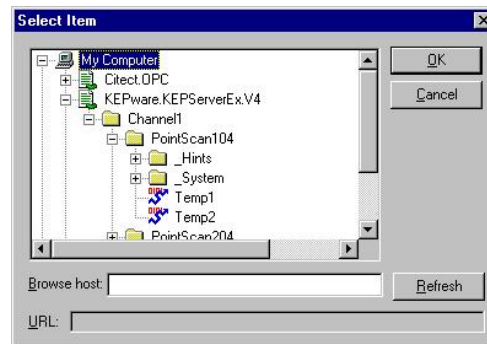
3(a) Select the channel that is to be configured. Note that a green socket indicates the channel for which selected options will be applied. In the previous figure, channel 0 is selected.

3(b) For the connection *Type*, select **OPC**.

3(c) Click on the <**Select Item**> button.

DASYLab will search the computer registries and list every OPC server program that resides on your computer.

3(d) Locate and expand the OPC Server Software identifier (see following figure). In the figure we selected **KEPware.KEPServerEx** for the Kepware OPC Server Software. In addition, we expanded Channel 1 to show **PointScan104** and its associated tags (**Temp1** and **Temp2**); as well as **PointScan204** (not shown in its entirety) to show its associated channel tags (**Temp3** and **Temp4**). You would need to scroll down to see Temp3 and Temp4.



*Expanding the Server Item*

3(e) From the expanded list, select the channel tag that applies to the channel currently being configured.

*In our example* tags will be assigned to channels as follows:

PointScan104 / Temp1: Channel 0

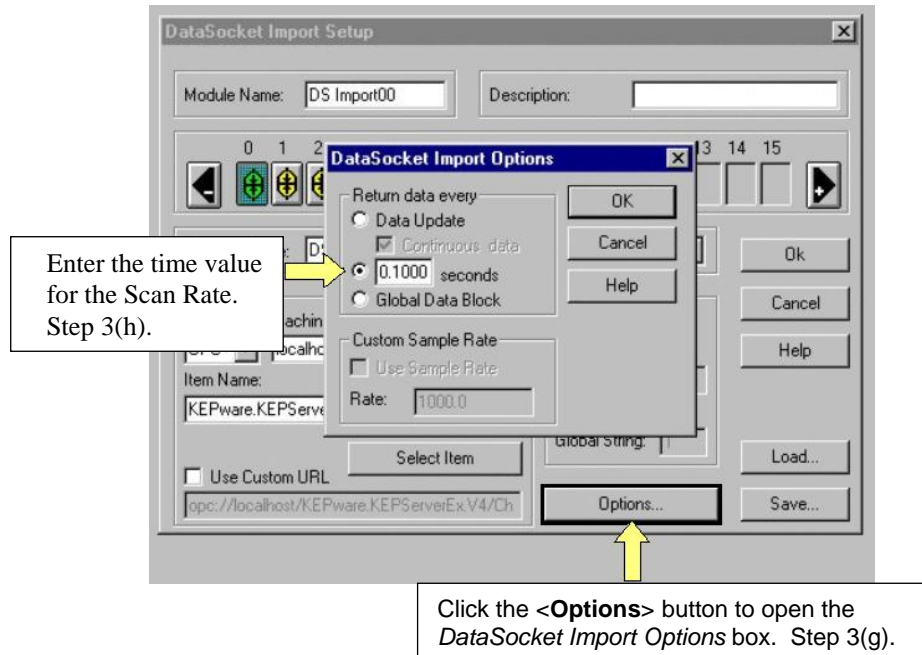
PointScan104 / Temp2: Channel 1

PointScan204 / Temp3: Channel 2

PointScan204 / Temp4: Channel 3

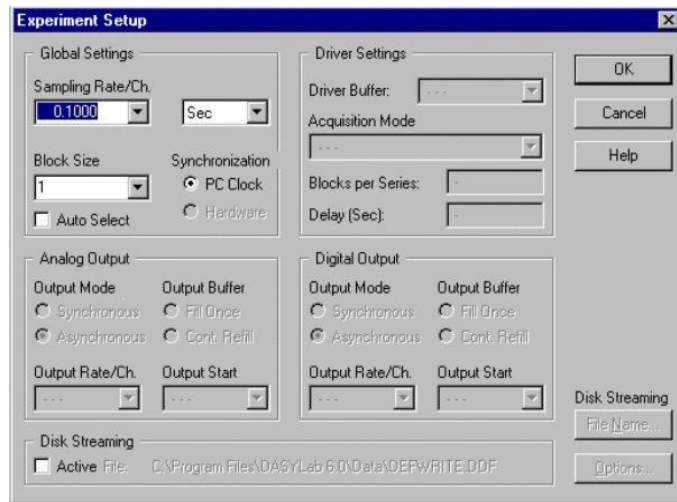
3(f) For the channel that is being configured, select the desired "tag" by highlighting it; then click <OK>.

3(g) Click the <Options> button (following figure). The *Data Socket Import Options* box will open.



3(h) Enter the time value for the scan rate and Click <OK>. The resulting scan rate, i.e., *data return per unit time*, is what we want DASyLab to use for the PointScan device. The previous figure indicates that we want to have data returned every 0.1000 seconds, (10 samples/sec). Note that the time factor entered here will later be entered in the *Experiment Setup* window [step 9, page 5-10].

4. Repeat step 3 for each of the remaining channels. Continue with step 5 after all channels have been configured.
5. Click the <Save> button and save your setup under an appropriate filename and location.
6. Close the *DataSocket Import Setup* box.
7. From the **Experiment** pull-down menu, select *Experiment Setup*. An *Experiment Setup* box will appear (following figure).



### Setting Block Size and Scan Rate in Experiment Setup

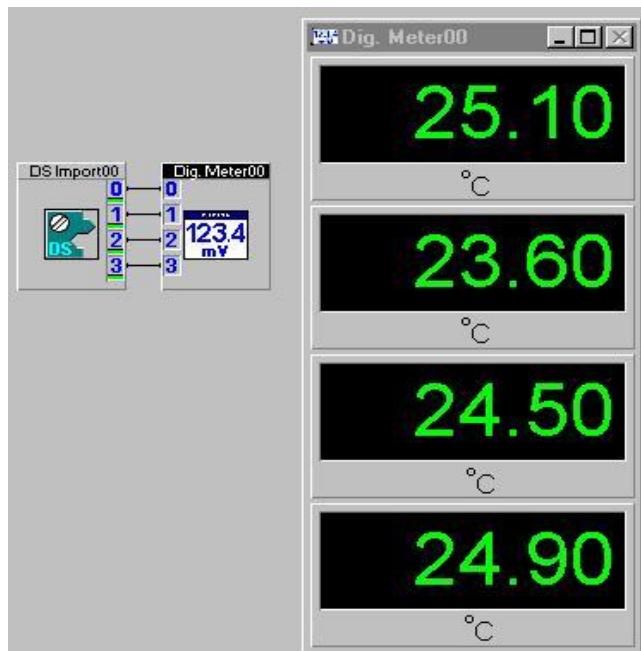
8. In the *Experiment Setup* window, in the *Global Settings* frame (see above figure), verify that **Auto Select** is *unchecked* and that the **Block Size** is set to **1**.
9. In the *Global Settings* frame, under *Sampling Rate/Ch.*, set the time value to the match the value that was specified in the *DataSocket Import Options* box [step 3(h), page 5-9]. Set the units to **Sec**. The resulting scan rate, i.e., *data return per unit time*, is for data to be returned once every 0.1000 seconds. This is equal to 10 samples/sec.



**For each DASyLab worksheet module — in the *Experiment Setup* window, set the Block Size and the Sampling Rate to match that of the first module. This will ensure that the data from each worksheet module coincides with the data from the DataSocket Import module.**

10. Close the *Experiment Setup* window.
11. From the **Module** pull-down menu, select *Display*, then select an appropriate display module. This will allow you to see the data after the play button is clicked.

This completes the procedure for configuring DASyLab for PointScan.



*DataSocket Import Module attached to a Digital Meter Module*



## Standard DASyLab Driver (*DaqBoard/DaqBook/WaveBook/TempBook*)

IOtech WaveBook users now have two choices of DASyLab drivers. These are:

- **Standard DASyLab Driver** (*DaqBoard/DaqBook/WaveBook/TempBook*)
- **Enhanced DASyLab Driver** (*with multiple WaveBook and WBK40/41 support*)

You should use the **Enhanced DASyLab Driver** if:

- You wish to run multiple WaveBook systems concurrently.
- You are using WBK40/41 modules in your system.

You should use the **Standard DASyLab Driver** if:

- You have already created DASyLab Worksheets for your system and you *do not* plan to use WBK40/41 modules or multiple WaveBooks in your system.
- You require optimal throughput performance while using a single WaveBook system.

If neither of the above scenarios applies, then either driver can be used for your WaveBook DASyLab application.

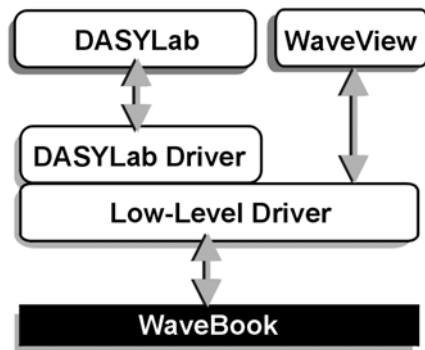
**Note:** You can download the latest hardware and DASyLab drives from our web site at [www.iotech.com](http://www.iotech.com).



### Reference Notes:

- Users of the **Enhanced DASyLab Driver** refer to *chapter 2*.
- Users of the **Standard DASyLab Driver** refer to this Appendix.

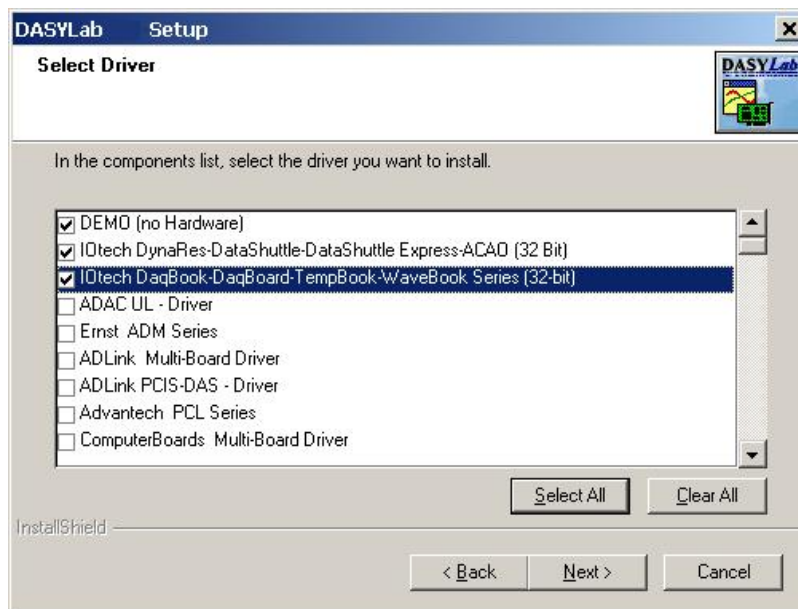
<b>Install DASyLab .....</b>	<b>A-2</b>
<b>Install Low-Level Hardware Driver .....</b>	<b>A-3</b>
<b>Select the Driver .....</b>	<b>A-4</b>
<b>Configure the Hardware .....</b>	<b>A-5</b>
<b>Putting Modules on the Worksheet .....</b>	<b>A-8</b>
<b>Working with the WaveBooks and WBK Options .....</b>	<b>A-8</b>
WaveBook .....	A-9
WBK14 .....	A-8
WBK15 .....	A-9
WBK16 .....	A-11
WBK17 .....	A-12
WBK18 .....	A-13
WBK40 .....	(refer to chapter 2)
WBK41 .....	(refer to chapter 2)
<b>FIFO Settings (for WBK30 Option) .....</b>	<b>A-15</b>
<b>General Experiment Setup .....</b>	<b>A-17</b>



*Software Support Structure*

## Install DASyLab

1. Launch *DASyLab* installation from the *DASyLab* CD. Note that the CD should *auto-start*. If the CD does not auto-start, run **start.exe** from the CD.
2. Select "Installation," then "Full Version." The actual installation process begins.
3. When prompted for your *name*, *company* and *serial number*, enter the requested data. Obtain the serial number from the CD jacket. Keep the number in a safe place for future installations and upgrades.
4. When prompted for the installation directory and program folder, use the default selection, or choose another. We recommend that the default directory and location be used.
5. When prompted for **Setup Type**, choose from the available options. We recommend that you select *Typical*.
6. When prompted to select the **Hardware Driver**, check the entry:  
**IOtech DaqBook-DaqBoard-WaveBook-TempBook series (32-bit)**.  
 You may also select other drivers [for any other supported hardware you have] at this time.



**Selecting: IOtech DaqBook-DaqBoard-WaveBook-TempBook Series [32-bit].**  
*Other device drivers are to be selected only if applicable.*



**Make sure a check mark appears next to your selection(s). Choices that are merely highlighted and not checked will not be installed.**

**Note:** If you allowed the IEEE488 (GPIB) drivers to be installed, you will be able to select the vendor.

7. A final screen displays the selected options about to be installed. Be sure the report matches your intended choices. Step back to modify settings if needed.

**Note:** After *software installation* is complete you may be required to restart Windows. After restart, continue with the following section, *Hardware Driver installation*.

---

## Install Low-Level Hardware Driver

If the hardware drivers for your device are not yet installed, or if you have received a new IOtech Data Acquisition CD, follow these steps.



**Note!** Both the low-level drivers, installed from the Data Acquisition CD, and the *DASYLab* drivers, installed from the *DASYLab* CD, are required for *DASYLab* operation.

**Note:** The installation will automatically perform version verification to ensure that only newer support is installed.

1. Launch the Data Acquisition Software CD. Note that the CD should *auto-start*. If not, run **start.exe** from the CD.
2. Select the 32-bit drivers for all hardware models that you will be using.
3. Select **DASYLab Drivers**, if you did not do so in step 2.
4. Click the **Start Install** button.

**Note:** When the low-level drivers are installed, *WaveView* (an out-of-the-box data collection application) is also installed.



**Use WaveView to verify connections and configurations. This use of WaveView can be very beneficial, especially in applications making use of DBK signal conditioning cards and expansion modules.**

5. Verify your hardware installation using the Resource Test in the *Daq\* Configuration Control Panel Applet*. Refer to the data acquisition user's manual for instructions on using the applet and configuring device names.



*Selecting the Daq\* Configuration Control Panel Applet*

**Note:** You can download the latest hardware and *DASYLab* drives from our web site at [www.iotech.com](http://www.iotech.com).

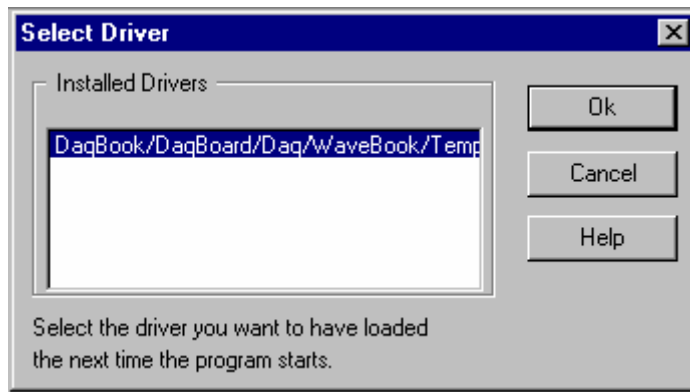


### Reference Note:

After completing the following driver-selection and hardware setup steps you will be ready to add icons to your worksheet. Refer to *DASYLab's* On-line *Help* for detailed information.

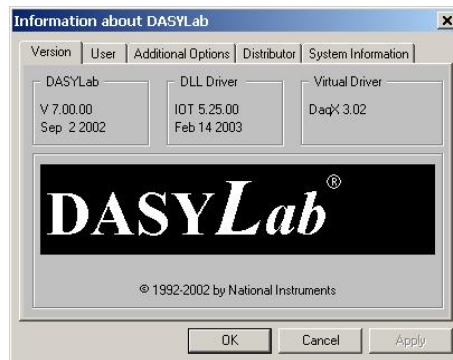
## Select the Driver

1. Start *DASYLab* and go to **Experiment / Select Driver** (see following figure).



*Experiment / Select Driver Window*

2. When the driver selection menu is presented, select the desired IOtech hardware products from the list. You may be prompted to restart *DASYLab* for the changes to take effect. If so, exit and restart *DASYLab* before continuing.
3. Click **Help / About DASYLab**. The Information about *DASYLab* screen will appear (see following figure).
4. In the DLL Driver frame, make sure you have version IOT5.06 or higher.
5. In the Virtual Driver frame, make sure you have DaqX 2.09 or higher.



*“Information about DASYLab” Screen, “Version Tab” Selected.*

*Viewing Version Frames for: DASYLab, DLL Driver, and Virtual Driver.*

6. Use the Additional Options tab to confirm that the options you purchased have been properly installed.
  - *DASYLab+* is called **Full**
  - *Basic* is called **Basic**
  - *Lite* is called **LE**

If you did not receive the version listed on your purchase order, contact IOtech’s Technical Support Department ([ProductSupport@iotech.com](mailto:ProductSupport@iotech.com)).

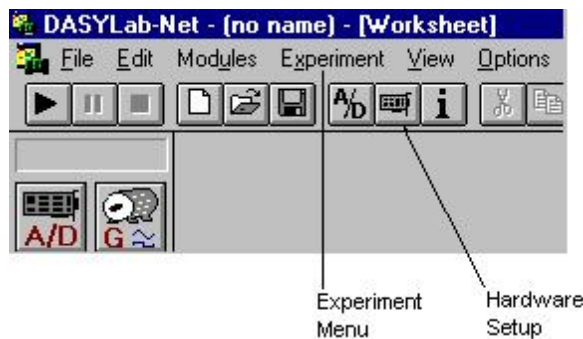
7. Click **OK** to close the Additional Options window.

## Configure the Hardware

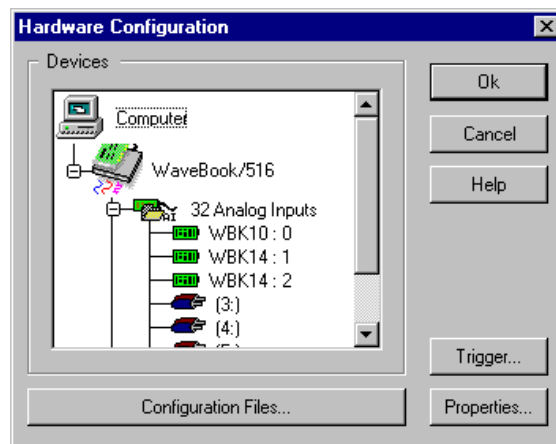
Before configuring DASYLab's hardware settings, make sure the hardware is setup properly. Checking for valid readings with WaveView first is recommended. If the hardware has jumpers, make sure they are in the desired positions.

Use the following steps to setup DASYLab to work properly with your hardware.

1. Launch the DASYLab application.
2. Open the **Hardware Configuration** dialog box in either of two ways:
  - (a) click on the circuit board in the horizontal toolbar, or
  - (b) click on Experiment in the menu bar and then click on Hardware Setup.



A Hardware Configuration dialog box will appear, similar to that shown in the following figure.



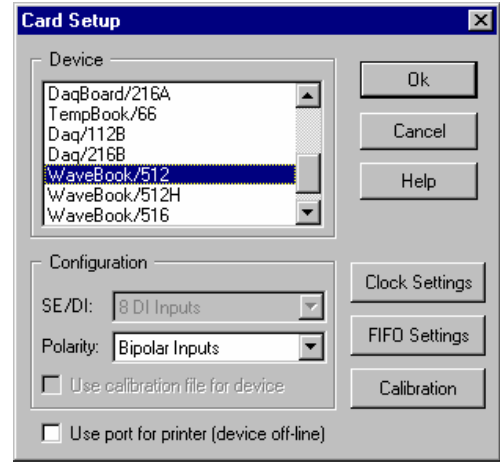
*Hardware Configuration Dialog Box*

3. To change the acquisition device:
  - (a) Select the present acquisition device [From the configuration tree].
  - (b) Click on the **<Properties>** button.

The Card Setup dialog box will appear (following figure).

The Card Setup dialog box handles the selection of the main unit hardware and its configuration.

To select the device, simply scroll through the Device window and highlight the appropriate hardware.

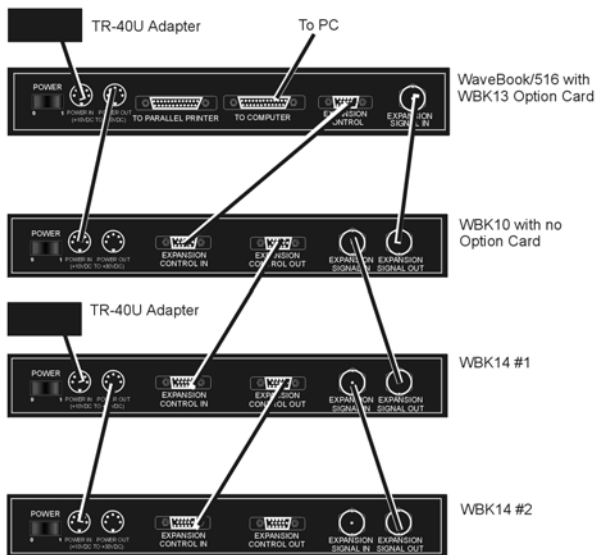


*Card Setup Dialog Box*

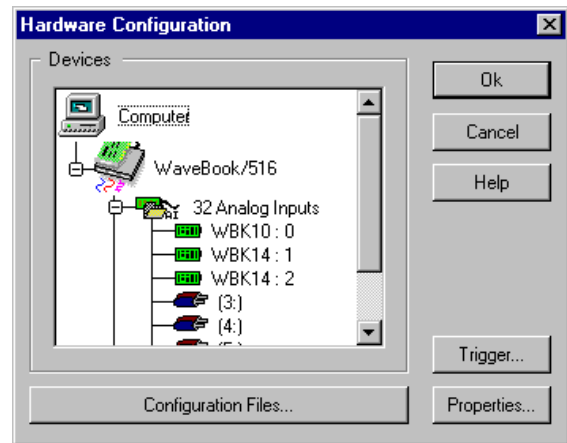


The hardware type selected must exactly match hardware configured through the Control Panel. If the device is not configured or properly installed, worksheets will not run. However, they can still be created and modified.

## Notes Regarding Daisy-Chains



*Example of WaveBook Daisy-Chain*

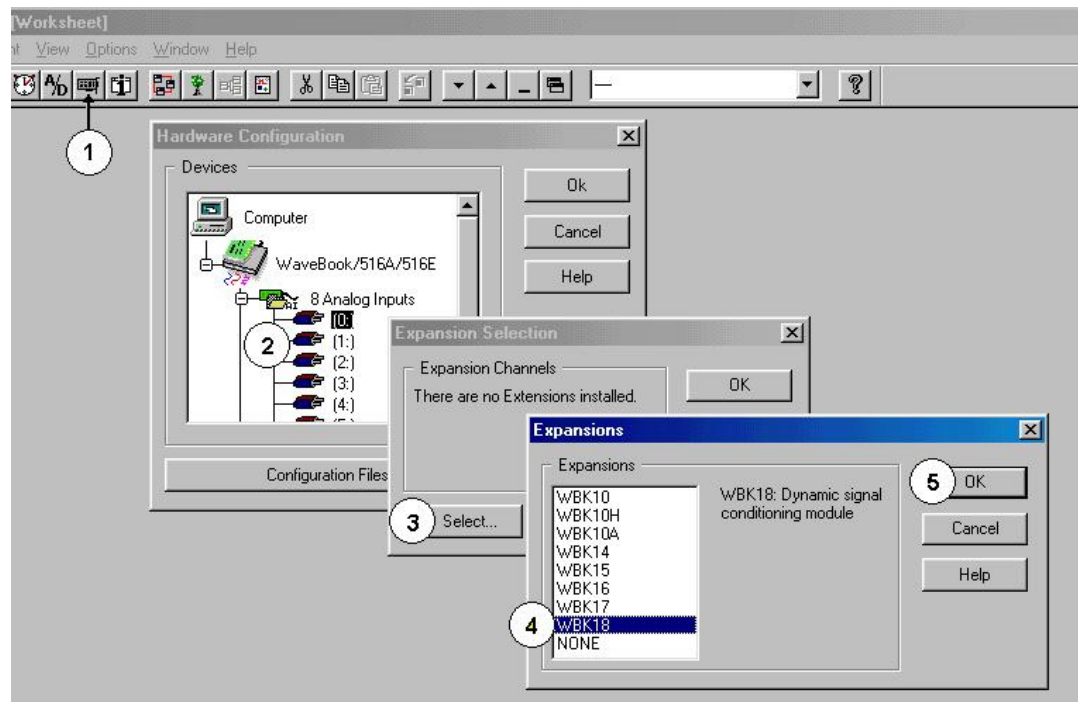


*Hardware Configuration (Matches Daisy-Chain)*

- Ensure that WBK modules are always positioned in sequential order.
- Never leave a gap in connector assignments. For example, if three WBKs were added, they must occupy connectors 0-1-2, not 0-1-3.
- Make sure that the WBKs in the connector list are in the same order as they appear in the physical hardware daisy chain (see previous figure).
- The WBK11, WBK12, WBK13, and WBK30 options are automatically detected when a WaveBook is selected.
- Each WaveBook can have up to eight WBKs attached to it. The first WBK will have an identification of [0] and the eighth WBK will have an identification number of [7] as indicated in the following figure.

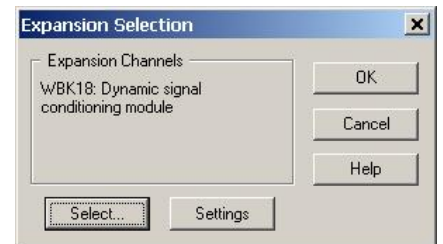
## How to Add a WBK Module to a DASyLab Setup.

Complete the following steps to add a WBK module to the DASyLab setup. You will need to repeat steps 2 through 5 for each additional module. If you have not already done so, review the preceding section, *Notes regarding Daisy Chains*, page A-6.



### *Adding a WBK Module to an Analog Input Connector*

1. Single-click the <Hardware Setup> button.  
The Hardware Configuration dialog box will appear.
2. Double-click on the Analog Inputs icon to expand its list of connectors; then double-click the applicable connector. In the above figure, connector [0] has been selected. This is indicated by a black square surrounding the number.  
The Expansion Selection dialog box appears. If no hardware was assigned to the connector the message “There are no Extensions installed” will be displayed, as in the above figure.
3. Click the <Select> button.  
An Expansions dialog box appears with a list of available expansion devices. The list includes a selection entitled "None." This is used to remove a previously connected device from the configuration tree.
4. Select the desired device. In the above example WBK18 has been selected.
5. Click the <OK> button.  
The Expansion Selection dialog box indicates the chosen device. In this example, a WBK18 module was selected. Thus the dialog box appears as indicated in the right-hand figure.
6. To go back and make other WBK connections, click the <OK> button. If you desire to configure the WBK module at this point in time, click the <Settings> button. Module settings are discussed later in this chapter.



## Putting Modules on the Worksheet

The WaveBook and WBK option modules can be found in the **Analog Input Module** menu. You can add your modules to the worksheet, as you deem appropriate.



**If you place an icon on the worksheet that is not physically or properly connected in the WaveBook daisy chain, your worksheet will generate an error “0x10”.** This is caused by assigning WBKs to connectors in the **Hardware Setup** that do not exist in the *physical setup*.

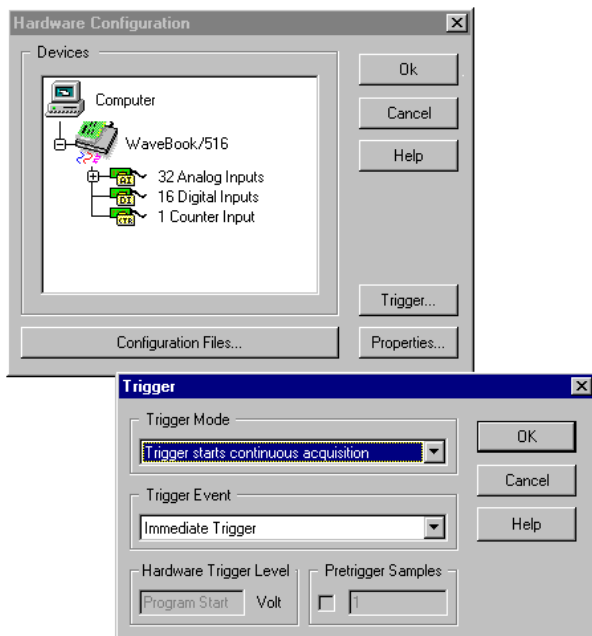
**Correcting the hardware configuration so it matches your setup will eliminate the error.** This means that you can't develop your worksheet without having the hardware setup actually connected to your computer's parallel port interface.

## Working with the WaveBooks and WBK Options

### WaveBooks

To use one of WaveBook's many triggering features, open the Hardware Configuration dialog box, then click the <Trigger> button. This accesses a Trigger dialog box from which you can set various trigger-related parameters.

There are several software trigger functions can be used on the *DASYLab* worksheet to control data flow. Thus, the worksheet can be set to run in a continuous fashion while the software triggers regulate the flow of data.



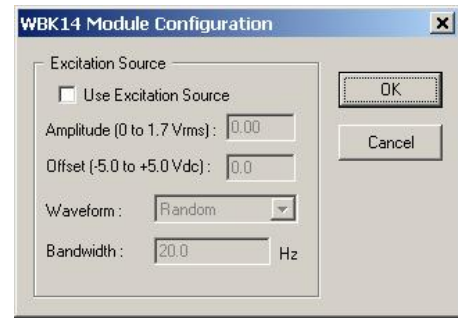
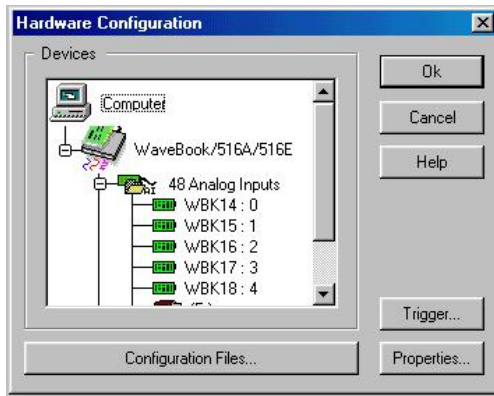
*Configuring the Trigger for WaveBook*

### WBK14

To adjust WBK14 settings you will need to access the WBK14 Expansion Selection dialog box. To do this:

1. Open the Hardware Configuration dialog box.
2. Double-click on the WBK14 icon in the Analog Input list (see following figure, left-hand side). The Expansion Selection box [not shown] will appear.
3. In the Expansion Selection dialog box, click on the <Settings> button. The WBK14 Module Configuration dialog box will appear (following figure, right-hand image).
4. Adjust the settings as desired, then click the <OK> button.

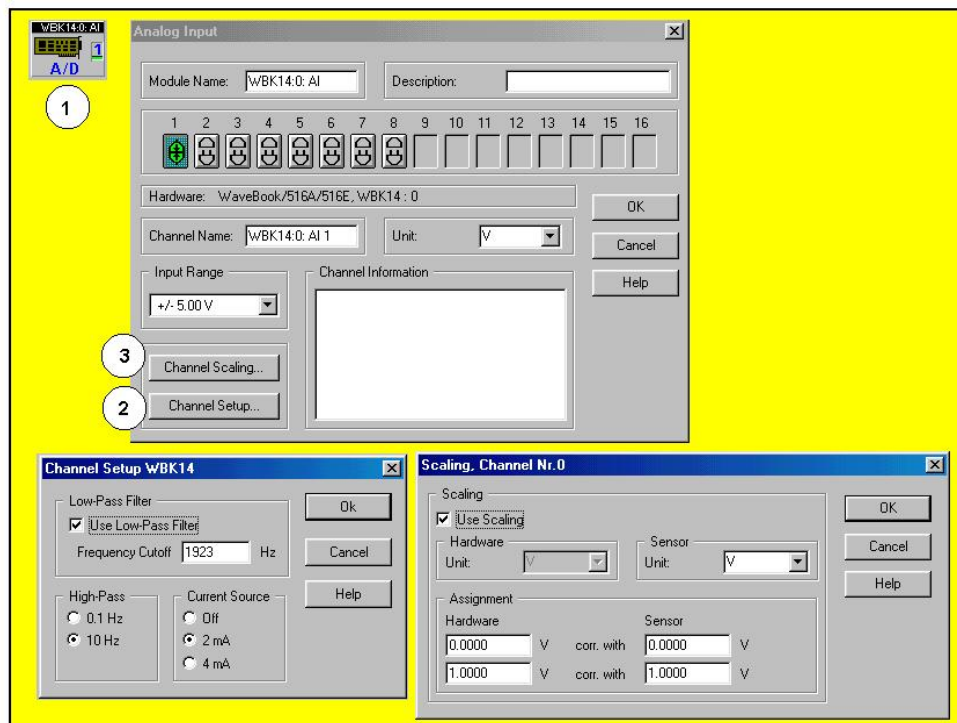




To access WBK14's programmable features:

1. Double-click on the worksheet's WBK14 icon. The Analog Input dialog box will appear.
2. On the Analog Input dialog box, click the <Channel Setup> button. A Channel Setup dialog box will appear with Filter and Current Source options.
3. If you desire to set a hardware-to-sensor scaling factor, click the <Channel Scaling> button. This feature provides a means of converting the incoming voltages to desired engineering units. Note that this function can also be accomplished using DASYLab's scaling module.

Configuration of the waveform output is handled in *hardware setup*.



### Setting Analog Input Parameters for WBK14

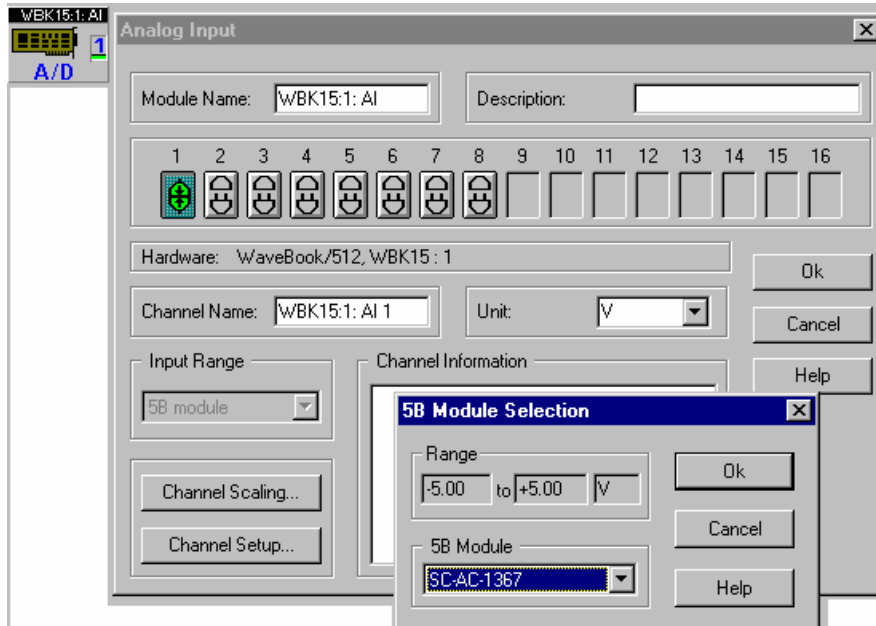


#### Reference Notes:

- The DASYLab Manual (p/n 472-0901) and DASYLab Help menu provide additional information on DASYLab.
- The *WBK Options Manual* (p/n 489-0902) contains details on that module and should be reviewed by all WBK14 users.
- The WaveView PDF document includes software information that may be of benefit to your DASYLab application. The WaveView document can be accessed via the <View PDFs> button on the IOtech data acquisition CD.

## WBK15

To associate 5B modules with the channels of the WBK15, double click the **WBK15 icon** on the worksheet then click **Channel Setup**. To use a 5B that is not in the supported list, select a module from the list that has a voltage range that is similar to the one you are using. Use the **Channel Scaling** button to correct for engineering unit conversion discrepancies.



*Channel Setup, Analog Input for WBK15, Module 1, Channel 1 (Using a 5B Module)*

## WBK16

For proper operation, each WBK16 channel must be tuned through a process of calibration.

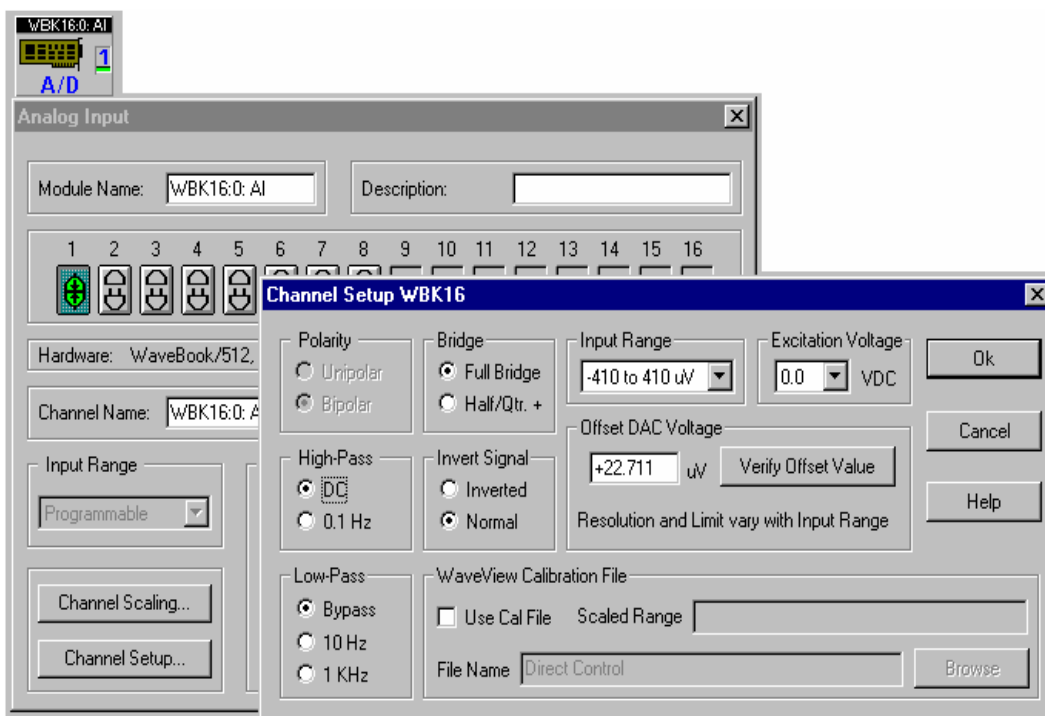


Although the DASyLab interface provides a means to manually setup the parameters of each WBK16 channel, it is highly recommended that WaveView be used to calibrate the WBK16 channels using its automated calibration feature.

During the calibration process, WaveView generates a calibration file that DASyLab can use to setup all of the channels.



To perform a Shunt Calibration, WaveView *must* be used. For instructions on using WaveView, refer to the WaveBook User's Manual.



### *WBK16 Channel Configuration*

In DASyLab, to use a WaveView-created calibration file:

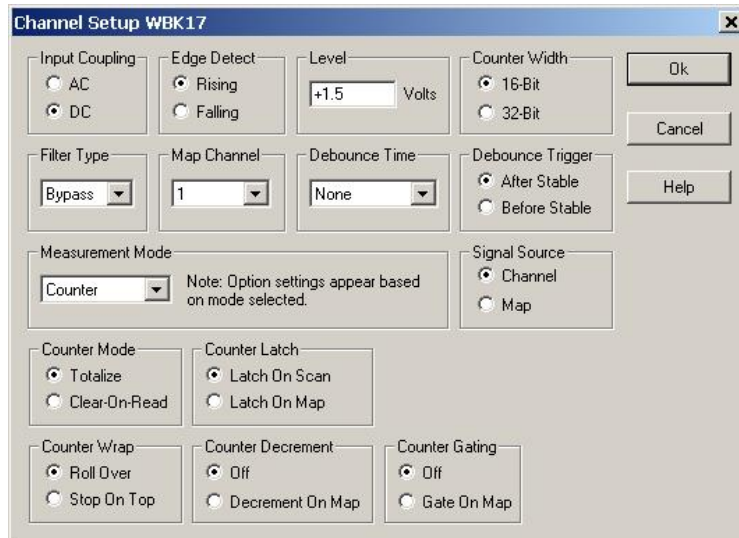
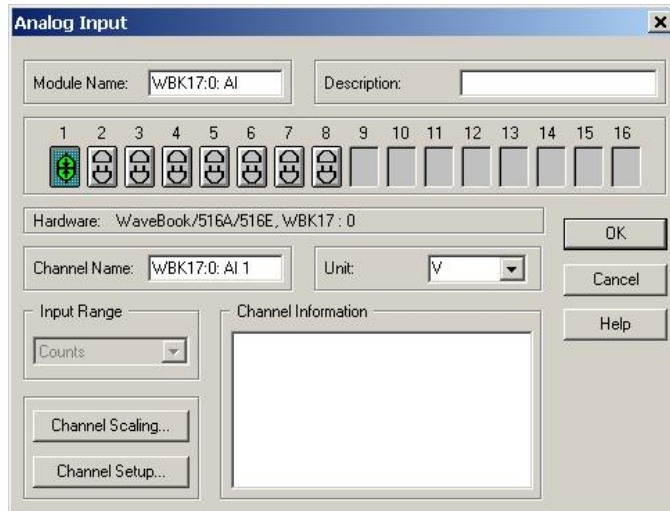
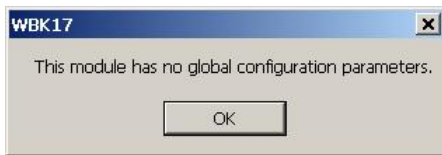
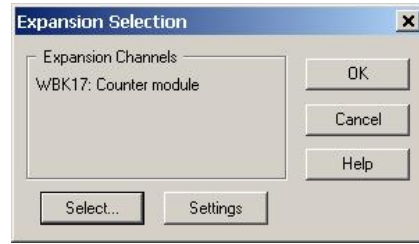
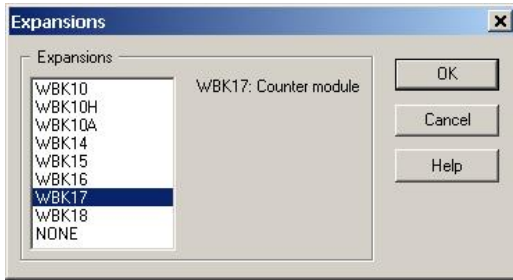
1. Double-click the **WBK16** icon in the worksheet.
2. Click **Channel Setup**.
3. Check the box marked, *Use Calibration File*.
4. Click the **Browse** button to locate the calibration file.  
This is typically named **WBK16.CAL**.

If you do not want to use the calibration file that was created by WaveView, this window provides the ability to do a *Name Plate* calibration. With *Name Plate* calibration, you manually set each of the channel's programmable parameters including:

- engineering units
- conversion factors
- excitation voltage
- bridge configuration
- software voltage range
- offset voltage.

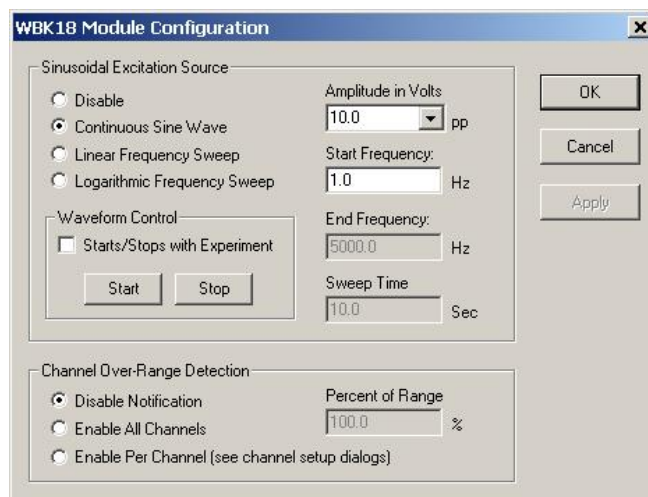
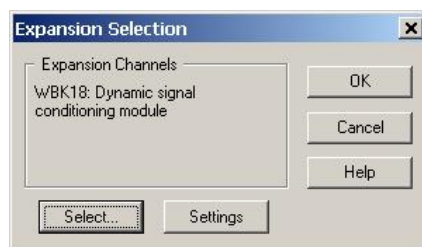
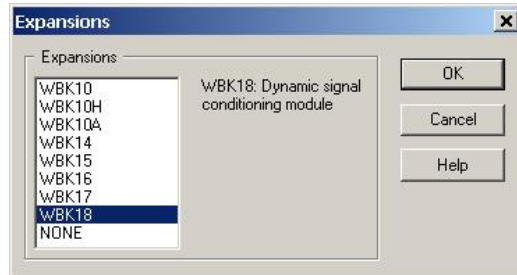
# WBK17

Focus for the WBK17 has been placed in the IOtech Enhanced DASYLab Driver with multiple WaveBook and WBK40/41 Support. Pertinent enhanced driver information is provided in chapter 2. For WBK17 users not wishing to use the enhanced driver, the following screen shots are provided as a brief visual aid. These images apply to the WBK17's use through the Standard DASYLab Driver (DaqBoard/DaqBook/WaveBook/TempBook).



## WBK18

Focus for the WBK18 has been placed in the IOtech Enhanced DASyLab Driver with multiple WaveBook and WBK40/41 Support. Pertinent enhanced driver information is provided in chapter 2. For WBK18 users not wishing to use the enhanced driver, the following screen shots are provided as a brief visual aid. The following images apply to the WBK18's use through the Standard DASyLab Driver (DaqBoard/ DaqBook/WaveBook/TempBook).





### Analog Input

Module Name: WBK18:0: AI Description:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Hardware: WaveBook/516A/516E, WBK18:0

Channel Name: WBK18:0: AI 1 Unit: V

Input Range: +/- 25.00 V

Channel Information

Channel Scaling... Channel Setup...

OK Cancel Help

### Channel Setup WBK18

Input Filters

Low Pass  
LPF Mode: 2-Pole  
Cutoff Freq (Hz): 20000 Hz

High Pass  
 Bypass  
 0.1 Hz  
 10 Hz

ICP Current Source  
 Off  
 4 mA

Enable channel over-range detection.  
(currently globally disabled for all module channels)

OK Cancel Help

### Scaling, Channel Nr.0

Scaling

Use Scaling

Hardware Unit: ... Sensor Unit: ...

Assignment

Hardware	Sensor
...	... corr. with ...
...	... corr. with ...

OK Cancel Help

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## ***FIFO Settings (for WBK30 Option)***

The **FIFO Settings** control will display the FIFO type and size of the unit if it is on-line.

If a programmable FIFO is installed (WBK30) it will allow for long acquisitions at speeds greater than the port throughput. If an infinite acquisition is attempted with a slow port, a FIFO overrun will eventually occur. Fixed length acquisitions in the series modes will never overrun if they fit within the FIFO.

**Note:** Downloading a full 64Meg Sample FIFO with a slow 100Khz parallel port can take over 10 minutes.

The following options are available for enhanced FIFOs. Using FIFO as primary buffer will:

- prevent *DASYLab* buffer overruns by only transferring data into *DASYLab* when there is room for it.
- enable Pre/Post acquisitions to buffer everything on the hardware until the acquisition completes.

After the acquisition completes, it is downloaded as *DASYLab* makes room for it. This allows use of the devices' maximum sample rate regardless of the port throughput or worksheet complexity.



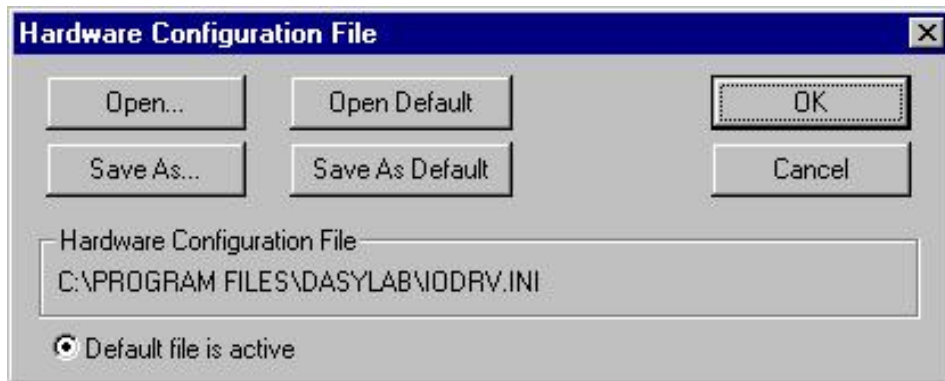
**Standard FIFO usage can cause *DASYLab* buffer overruns during complex worksheets. Standard Pre-Trigger acquisitions require that all data be *streamed* into *DASYLab*, and are thus limited to the parallel port throughput speed.**

### **In regard to transferring all good data from FIFO in event of a buffer over-run:**

Notification of the over-run will be held until all data has been transferred to *DASYLab*. Notification of the over-run will be present in *DASYLab*'s onscreen status bar, but the worksheet *will not stop until all readings have been downloaded*. This differs from typically seen actions; i.e., immediate stop followed by an error signal and FIFO flush.

## Configuration Files

The Hardware Configuration File saves ALL hardware settings not saved with the worksheet. Including the main unit type, DBK expansion options, trigger settings, etc. **The worksheet ONLY saves the channel number and the gain.** The default configuration file is loaded when *DASYLab* first loads.



*Hardware Configuration File*

The configuration file PATH and NAME is saved with every worksheet. When a saved worksheet is loaded, the hardware configuration file is read. If the file does not exist there will be an opportunity to load another. The default file is used when *DASYLab* loads.



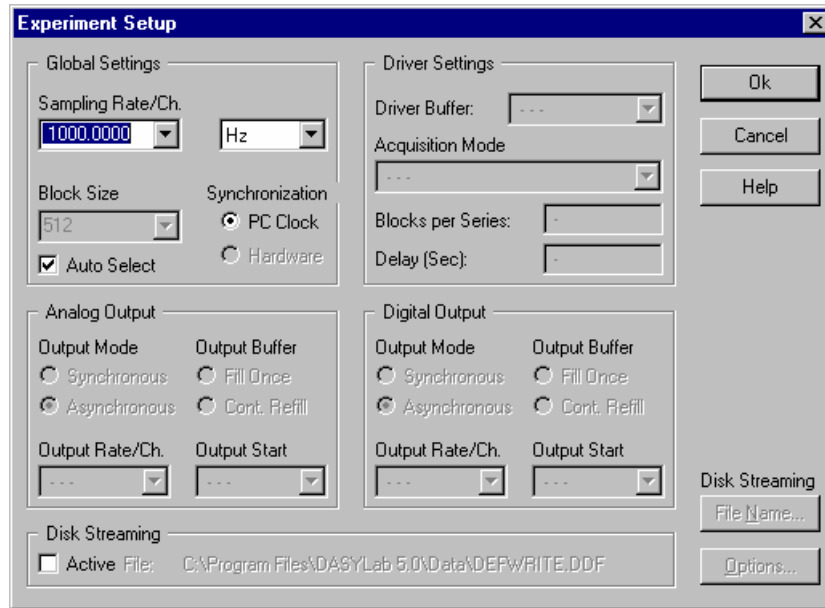
- **The configuration file is updated whenever any setting is accepted, i.e., OK is clicked.**
- **When creating a new configuration file, change the name before changing any settings.**
- **When sharing worksheets include the configuration file.**



## General Experiment Setup

The Experiment Setup regulates the general operation of the programmable hardware. These parameters affect the underlying performance of the A/D block at run-time.

To open the dialog box, select “**Experiment / Experiment Setup.**” Note that you can also open the dialog box by clicking on the A/D icon in the toolbar.



*Experiment Setup Window*

There are five sections in the Experiment Setup window. Of these, only *Global Settings* and *Driver Settings* are used with IOtech hardware.

### Global Settings

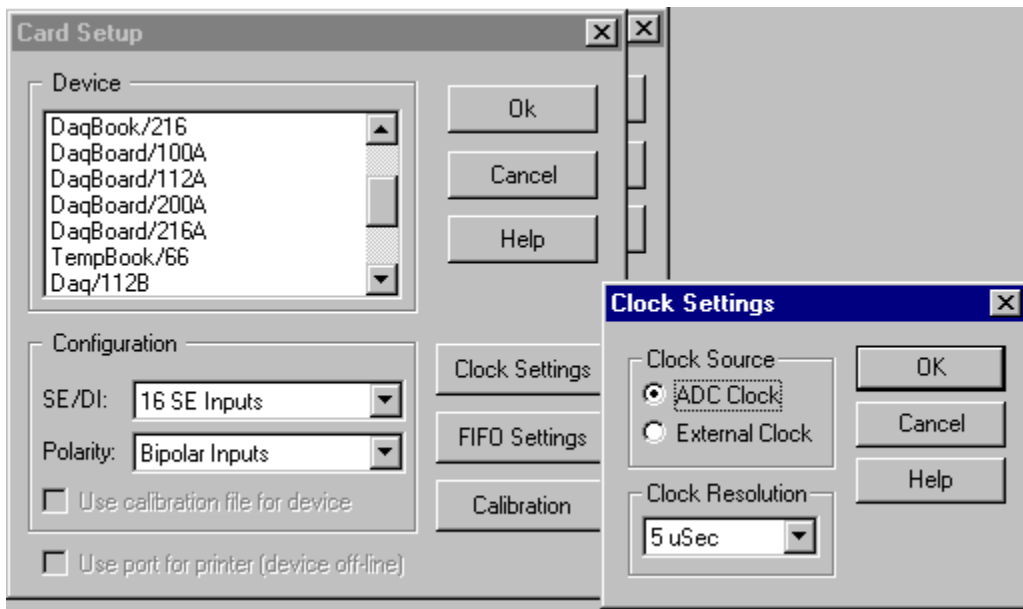
**Sampling Rate** – determines how fast the scans will be read

**Block Size** – determines how incoming data will be processed

**Synchronization** - sets the method of regulating system pacing

#### Sampling Rates

Device	Time Between Channel Scans
DaqBoard/2000	5 $\mu$ Secs or 10 $\mu$ Secs
Daq ISA-Type Devices	10 $\mu$ Secs
TempBook	10 $\mu$ Secs
WaveBook	1 $\mu$ Sec



*Card Setup and Clock Settings Windows*

*For example:* at 10 uSecs apart: if the Sampling Rate is set to 100Hz and there are 10 channels being read, then the 10 channels will be read in 100 uSec. 10 mSec later, they will be read again. The time between each channel read is fixed. The time between each scan read is adjustable using the Sampling Rate.

### **WaveBook**

For WaveBook, each channel in a scan is read 1 uSec apart.

*For example:* at 1 uSec apart if the Sampling Rate is set to 100Hz and there are 5 channels being read, the 5 channels will be read in 5 uSec. 10 mSec later, they will be read again. The time between each channel being read is fixed. The time between each scan read is adjustable using the Sampling rate.

### **Block Size**

The Block Size determines how DASyLab will process the incoming data. DASyLab processes data *n samples* at a time (*n samples = 1 block*). With a block size of 512, five hundred and twelve samples will be collected before DASyLab processes any data. For slow acquisitions, this may be considered too long.

As a rough rule of thumb, large block sizes are suitable for high speed measurements small block sizes lead to short response times and are better suited for asynchronous output and online visualization.



**Use small block sizes for slow acquisitions; and large block sizes for faster acquisitions (1Hz, block size of 1; 20kHz, block size of 2048).**

Sampled data can be transferred between the device and the PC in blocks of 2048 values each, or each sample can be transferred individually. In order to provide maximum performance and online visualization facilities, the appropriate transfer block size is selected automatically by the software.

Because DASyLab has to split computation time for the different actions performed, the block size specified in DASyLab defines how many samples are processed by DASyLab in a time-step.