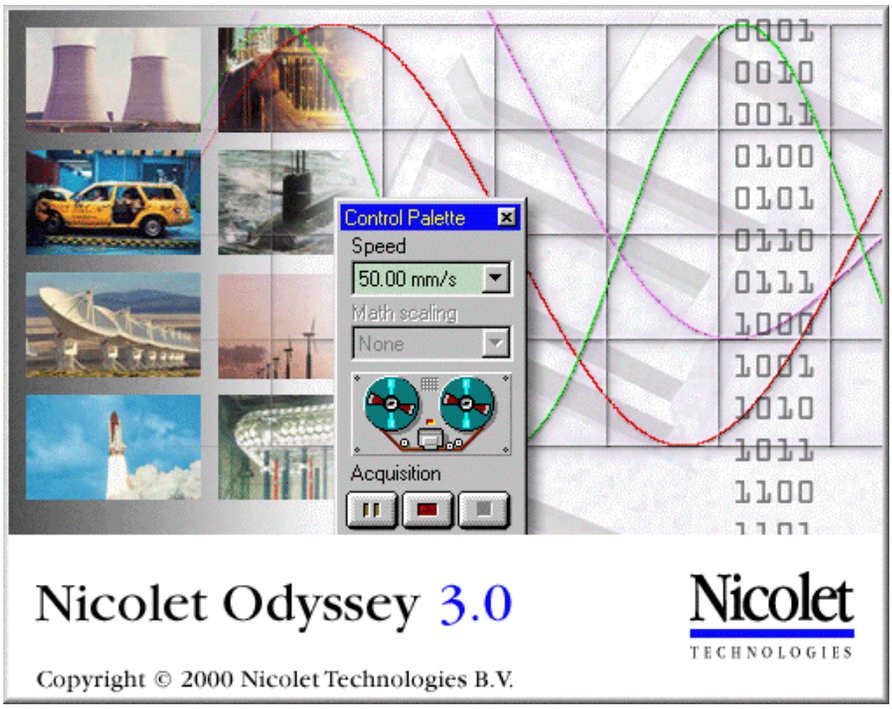
Volume 2

Version 3.0

Part Number 269-923504



Odyssey User's Guide

NICOLET INSTRUMENT TECHNOLOGIES INC.

5225 Verona Road, Bldg. 4

Madison, Wisconsin USA 53711

Phone (608) 276-5600 • Fax (608) 327-6700

www.niti.com

RECEIVING

Unpack the instrument and save the carton and packing material in case the instrument must be shipped to another site or returned to the factory for service.

INSPECTION

Inspect the exterior of the instrument for any visible signs of damage that may have occurred during transit.

If damaged, contact -

Nicolet Instrument Technologies

Customer Service
5225-4 Verona Road
Madison, Wisconsin 53711
Telephone 608/276-5600
FAX: 608/327-6700

Outside the U.S., call your local Nicolet office or distributor.

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Nicolet warrants that each product we sell you is free from defects in labor and materials and shall conform to its product specifications as defined in the product user documentation.

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The warranty period for new products sold inside the U.S.A. is 12 months from the date of invoice.

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YEAR 2000 COMPLIANCE

The Odyssey operating system and software has been tested and verified for correct operation concerning dates including the year 2000 and extending through the year 2030.

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Chapter 1:
Safety Messages

The first WARNING note below is required by the FCC and relates only to the interference potential of this equipment. This message is a direct quotation.

WARNING

The equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. As temporarily permitted by regulation, it has not been tested for compliance with the limits for Class A computing devices pursuant to Subpart B or Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

This apparatus has been designed in accordance with EN61010-1:1993, /A2:1995, and UL 3101-1, safety Requirements for Electronic Measuring Apparatus. The present instruction manual contains some information and warnings which have to be followed by the user to ensure safe operation and to retain the apparatus in safe condition.

The apparatus has been designed for indoor use. It may occasionally be subjected to temperatures between 0°C and +50°C without degradation of its safety.

The main plug shall only be inserted in a socket provided with a protective earth contact. The protective action must not be negated by the use of an extension cord without a protective conductor.

WARNING

ELECTRICAL SHOCK HAZARD!

Any interruption of the protective conductor inside or outside the apparatus or disconnection of the protective earth terminal is likely to make the apparatus dangerous. Intentional interruption is prohibited.

When the apparatus is connected to its supply, terminals may be live, and the opening of covers of removal of parts (except those to which access can be gained by hand) is likely to expose live parts.

The apparatus shall be disconnected from all voltage sources before it is opened for any adjustment, replacement, maintenance or repair.

Capacitors inside the apparatus may still be charged even if the apparatus has been disconnected from all voltage sources. Any adjustment, maintenance and repair of the opened apparatus under voltage shall be avoided as far as possible and, if inevitable, shall be carried out only by a skilled person who is aware of the hazard involved.

Whenever it is likely that the protection has been impaired, the apparatus shall be made inoperative and be secured against any unintended operation.

The protection is likely to be impaired if, for example, the apparatus shows visible damage or has been subjected to severe transport stresses.

WARNING

ELECTRICAL SHOCK HAZARD! Do not remove covers. Refer servicing to qualified individuals.

Proper use of this device depends on careful reading of all instructions and labels.

WARNING

This instrument and related accessories are not designed for biomedical experimentation on humans and should not be directly connected to human subjects.

WARNING

This instrument must not be operated in explosive atmospheres.

WARNING

Never operate the Odyssey mainframe in the vertical, upright position (resting on its rear panel) or the instrument may overheat from improper air circulation.

Always make sure the input signal does not exceed the maximum allowable input voltage, with respect to ground, listed in the specifications for this instrument.

Declaration of Conformity

Manufacturer: Nicolet Instrument Technologies
5225-4 Verona Road
Madison, WI 53711
USA

declares, that the product:

Product Name: Odyssey

is in conformity with the relevant EU Directives listed below:

EU EMC Directive 89/336/EEC
EU Low-Voltage Directive 73/23/EEC

using the relevant section of the following EU standards and other Normative documents:

EMC: EN 50081-2:1993
EN 55011 Class A
EN 50082-1:1992

Low-Voltage: EN 61010-1:1993/A2:1995

31 DECEMBER, 1996
date of issue

Christopher Barron, President

European Contact: Nicolet Technologies B.V.
Min. Aalberselaan 10
5103BA Dongen
Netherlands

Chapter 2:
About This Manual

Symbols Used in This Manual

The following symbols are used throughout this manual to indicate warnings and cautions.

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

WARNING

Indicates a fire hazard which, if not avoided, could result in death or serious injury.

WARNING

Indicates an electrical shock hazard which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury, or alerts against unsafe practices, or alerts against actions which could damage the product.

Manual Conventions

Several conventions are used throughout this manual for your convenience:

- ***Menu names*** and ***commands*** appear in bold, italic lettering.
- **Controls** and **control names** appear in bold lettering.
- References to callouts in the figures look like this: (**1**)

Chapter 3: Introduction

What's New in Revision 3.0

Revision 3.0 of the Nicolet Odyssey User's Guide contains several new topics. It pertains to Odyssey operating software Version 3.0 or greater. Revisions from Version 2.3 are listed below:

- Cycle Bus Storage, a powerful data reduction tool (see p. 8-4)
- X-Y display (see p. 10-21)
- Add more traces and display pages (see p. 8-84)
- Posting to Nicolet imPRESSion software (see p. 6-12)
- Several new export formats including UFF Type 58 (see p. 6-20)
- Resample to any user-entered rate when posting or exporting (see pp. 6-10, 6-21)
- Much faster copying speed from multi-board systems

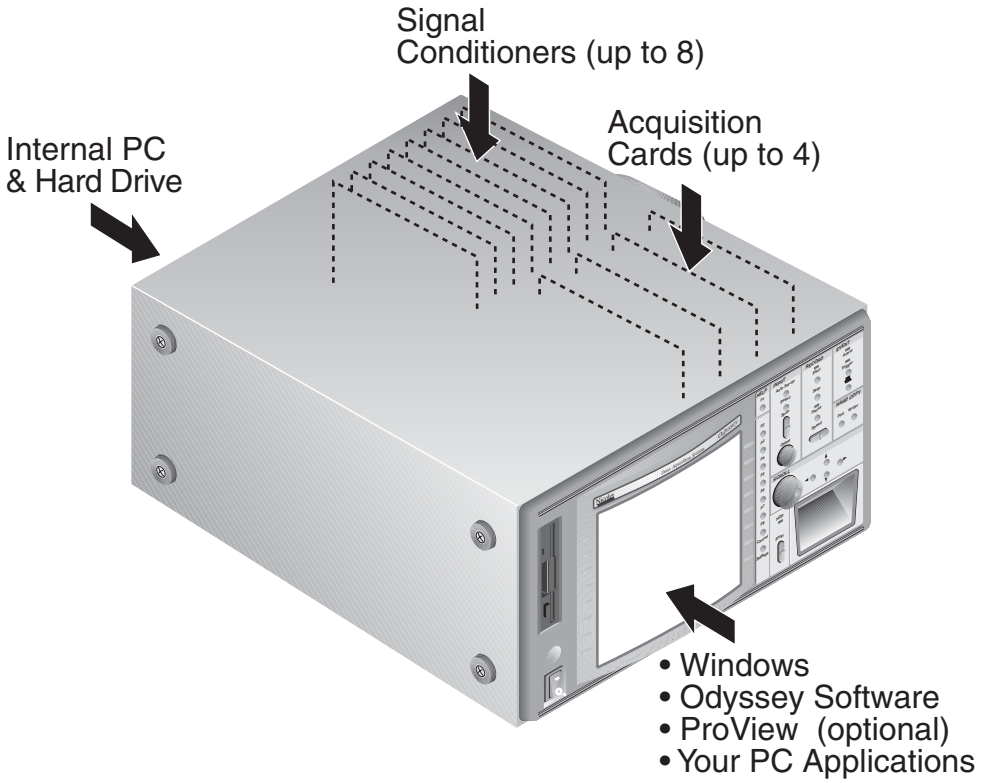
Introducing the Odyssey

Your Odyssey system consists of:

- Odyssey Mainframe
- Odyssey Software
- ProView or imPRESSion Software (optional)

The Odyssey main frame contains an internal PC running Microsoft® Windows. Depending on the configuration you ordered, it contains up to 4 acquisition cards.

Odyssey comes with Windows and the Odyssey software preloaded for your convenience. Depending on the options you ordered, it may also have ProView or imPRESSion preloaded. You can add other Windows compatible applications as necessary.



Understanding Odyssey's Acquisition System

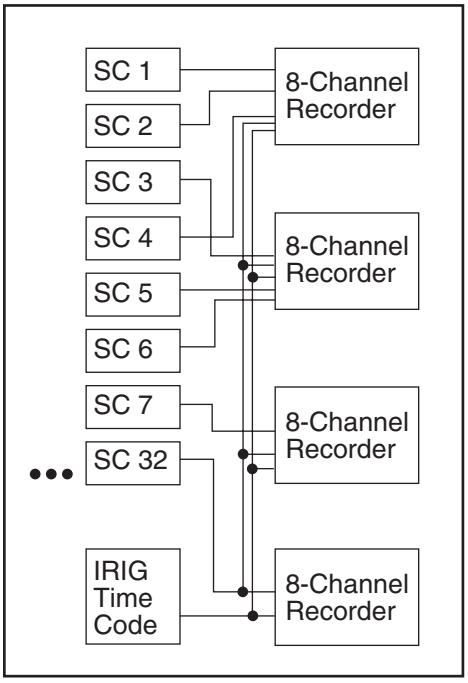
Odyssey is a multi-channel data acquisition system with up to 32 analog and 32 digital inputs. A family of acquisition cards is available to meet your varying applications. Each acquisition card has its own timebase and mass storage of several gigabytes. Therefore up to four different recording rates and over 36 gigabytes of storage are possible in one Odyssey system. Recording can be optionally synchronized to precision IRIG or GPS time references without consuming extra recording channels.

Odyssey signal conditioners are fully integrated into the chassis and operating software, but offer the same flexibility and function as standalone signal conditioners in an external cabinet. Fully configurable signal routing from signal conditioner to recording channel is provided, so the test engineer no longer needs to rewire a maze of BNC cables and change dozens of amplifier settings for the next test. Any recording channel can acquire data from any signal conditioner with a click of the mouse. This is especially convenient if one signal acts as an input to several channels, such as the Manifold Air Pressure sensor of an automobile engine providing the baseline reference for all cylinders' combustion pressure.

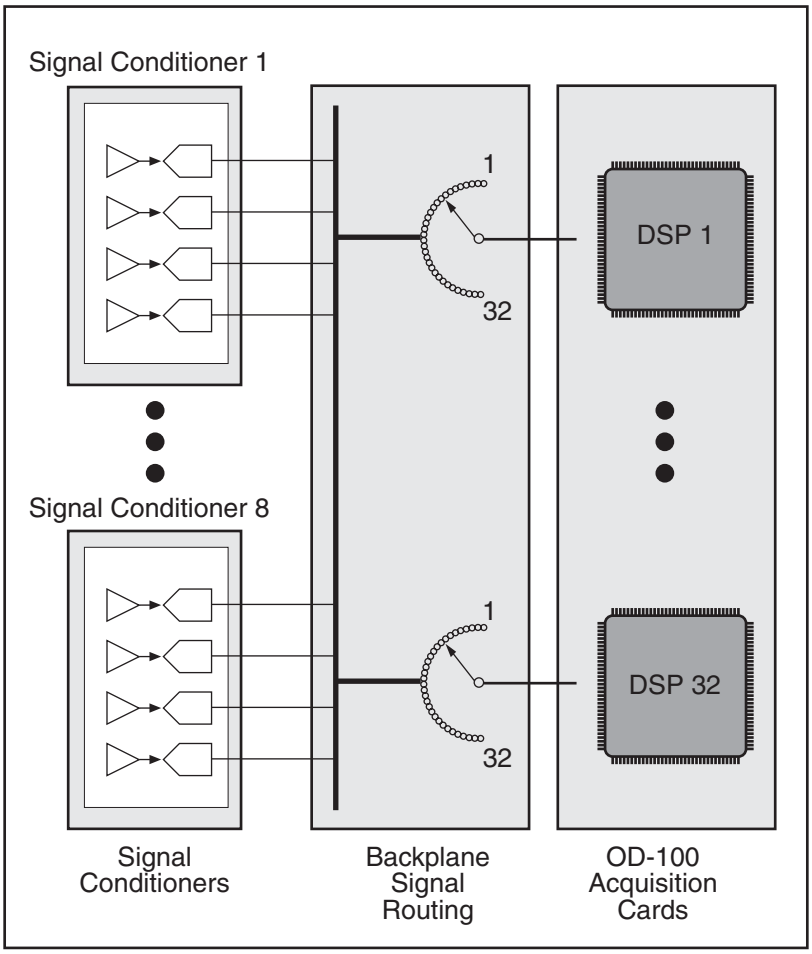
Most Odyssey signal conditioners contain four identical channels, and the mainframe provides 8 slots for any combination of modules. (The portable Odyssey R mainframe provides 4 signal conditioner and 2 acquisition card slots.) Programmable signal routing is provided on the backplane to eliminate manual cable reconfiguration. A voltage in Signal Conditioner 1 may be multiplied by a current in SC 32 to provide a power waveform in Channel 27 if desired.

Block diagrams of traditional data acquisition and Odyssey data acquisition are illustrated below.

Traditional Data Acquisition



Odyssey Data Acquisition



Odyssey Acquisition Cards

Two acquisition cards are available:

- Medium Speed OD-100: eight channels of 100 kS/s each. The OD-100 is optimized for streaming recording of electrical and physical signals, and is similar in function to a digital tape recorder. It features a Digital Signal Processor (DSP) on each channel for real-time calculations, digital filtering and intelligent triggering.
- High Speed OD-200: four channels of 10 MS/s each. The OD-200 is optimized for high speed transient recording in addition to continuous recording. It features a large memory for accumulating transients plus continuous storage at 500 kS/s per channel.

Both cards record directly to large internal SCSI hard drives for mass storage. The use of disk storage provides the massive capacity of a digital tape recorder while offering the convenience of random access, instant searching and fast data transfer. The following comparison chart outlines the major features of each card.

Acquisition Card Model:	OD-100	OD-200
Number of channels	8	4
Continuous Recording Rate (per ch)	100 kS/s	500 kS/s
Transient Recording Rate (per ch)	100 kS/s	10 MS/s
Digitizer Resolution	16 bits	14 bits (2-10 MS/s) 16 bits (< 2 MS/s)
Transient Memory (per ch)	N/A	2 MS (8 MS opt.)
Maximum Pre-trigger	Appr. 24 kS	Up to full transient memory (2-8 MS)
Maximum Storage	8 GB, >400 MS/ch.	36 GB, >3 GS/ch
Anti-alias Filter	Analog at ADC + Digital FIR decimation filter	Analog; 10 kHz, 100 kHz, 1 MHz
Real-time Math and Data Reduction	Yes	No
Stripchart Display	Yes	Yes
Fast Oscilloscope Display with FFT	No	Yes
Counter/timer inputs	One per card	No

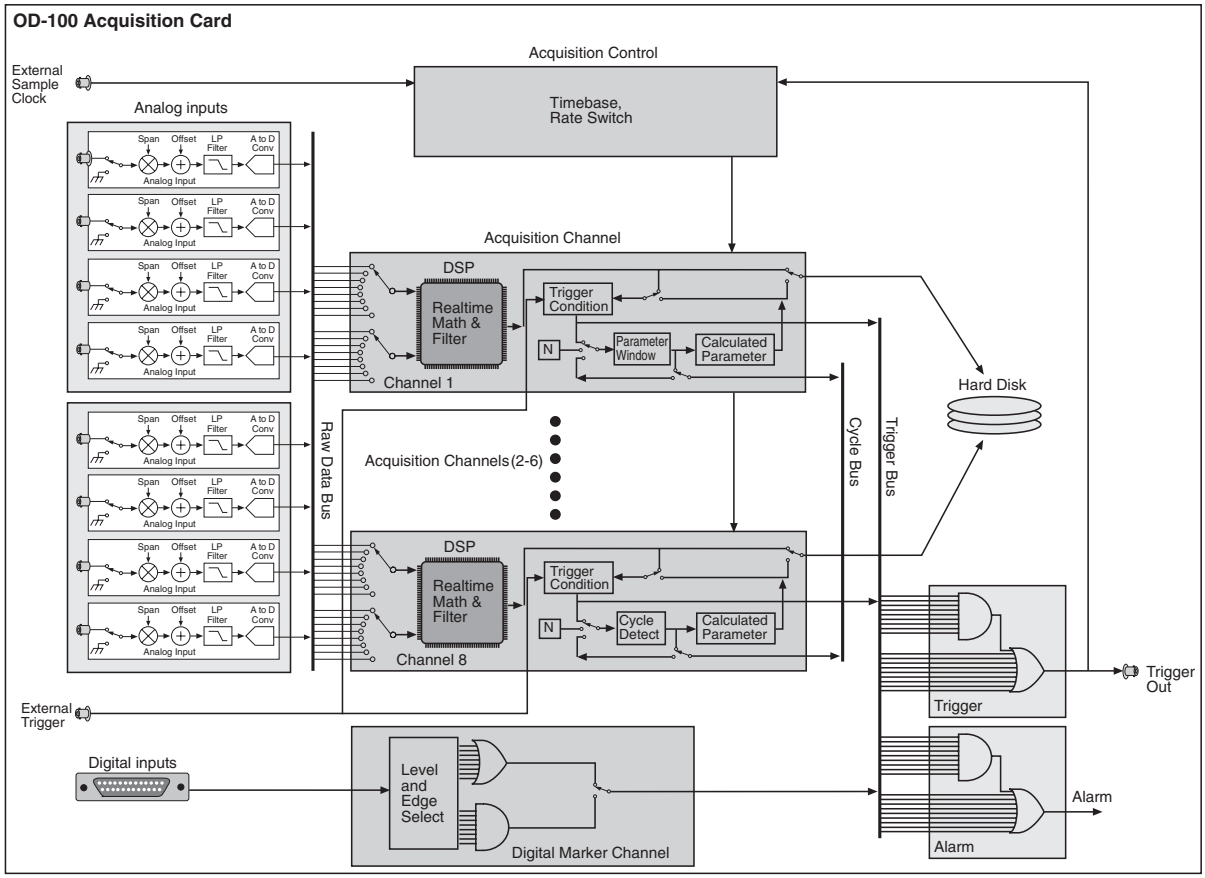
OD-100 Acquisition Card

After the signals are conditioned and routed, they arrive at the acquisition cards where the data is processed and recorded. The diagram below shows a single OD-100 card with its associated signal conditioning. A variety of signal conditioning modules may be freely selected, each containing independently adjustable channels. All OD-100 signal conditioners contain an independent 16-bit, 100 kS/s A-D converter for each channel.

Each OD-100 acquisition card contains eight analog channels. Each channel has a Digital Signal Processor (DSP) that performs real-time calculations on any one or two analog inputs. Each channel can produce a trigger event based on either the raw data or a calculated parameter. Trigger events can be logically combined to produce a trigger that can either be stored or cause the sampling rate to increase for a period of time. Eight digital inputs are available on each card and can be stored with the data or logically combined to produce a trigger event. Odyssey can also accept an external trigger. While recording, data from the 8 analog and 8 digital inputs on each card is streamed directly to an internal hard disk, which can store a large amount of data. Each OD-100 also includes a counter-timer channel for measuring frequency, RPM and position.

All OD-100 signal conditioners contain an analog anti-alias filter before the Analog-to-Digital Convertor. In most models this is a five to eight pole filter of Bessel characteristics. Bessel filters provide excellent waveform fidelity and phase linearity. This provides the best possible step response and impulse response. While very aggressive filters such as those used in sigma-delta A-D convertors can provide faster frequency-domain roll-off, they badly distort step response and will overstate transient peaks by up to 22% due to Gibbs phenomenon.

In addition to the analog filter which is always in-circuit before the ADC, the OD-100 card provides user-selectable digital FIR filters which you may use to prevent aliasing and reduce noise at any sample rate. For example if you select a sample rate of 1kS/s, the "Auto" filter selection first applies a 250Hz filter to the full speed ADC datastream, then downsamples to 1 kS/s. In this fashion anti-alias protection can be provided at all sample rates, even at very slow rates where aliasing is most likely to pose problems.



After data is stored to the acquisition hard disk(s), it can be reviewed, played back, mathematically analyzed, copied to a Windows directory, or plotted to stripchart writers or page printers. Even though an Odyssey can contain up to four acquisition disks, system software combines all channels for display, exporting, and copying to Windows.

OD-200 Acquisition Card

Each OD-200 acquisition board contains four high-speed analog channels and eight digital marker channels. It combines the speed of a transient recorder at 10 MS/s with extraordinarily fast continuous recording to disk at 500 kS/s on all channels simultaneously. Due to its high speed, the OD-200 board is supplied with its own special high-bandwidth differential amplifiers. Independent analog-to-digital convertors for each channel provide acquisition rates up to 10 MS/s with 14-bit resolution. At sample rates below 2 MS/s, a number of samples are averaged to increase resolution to 16 bits. Since the very high data rates preclude real-time DSP processing, a variety of powerful triggering modes are provided in hardware.

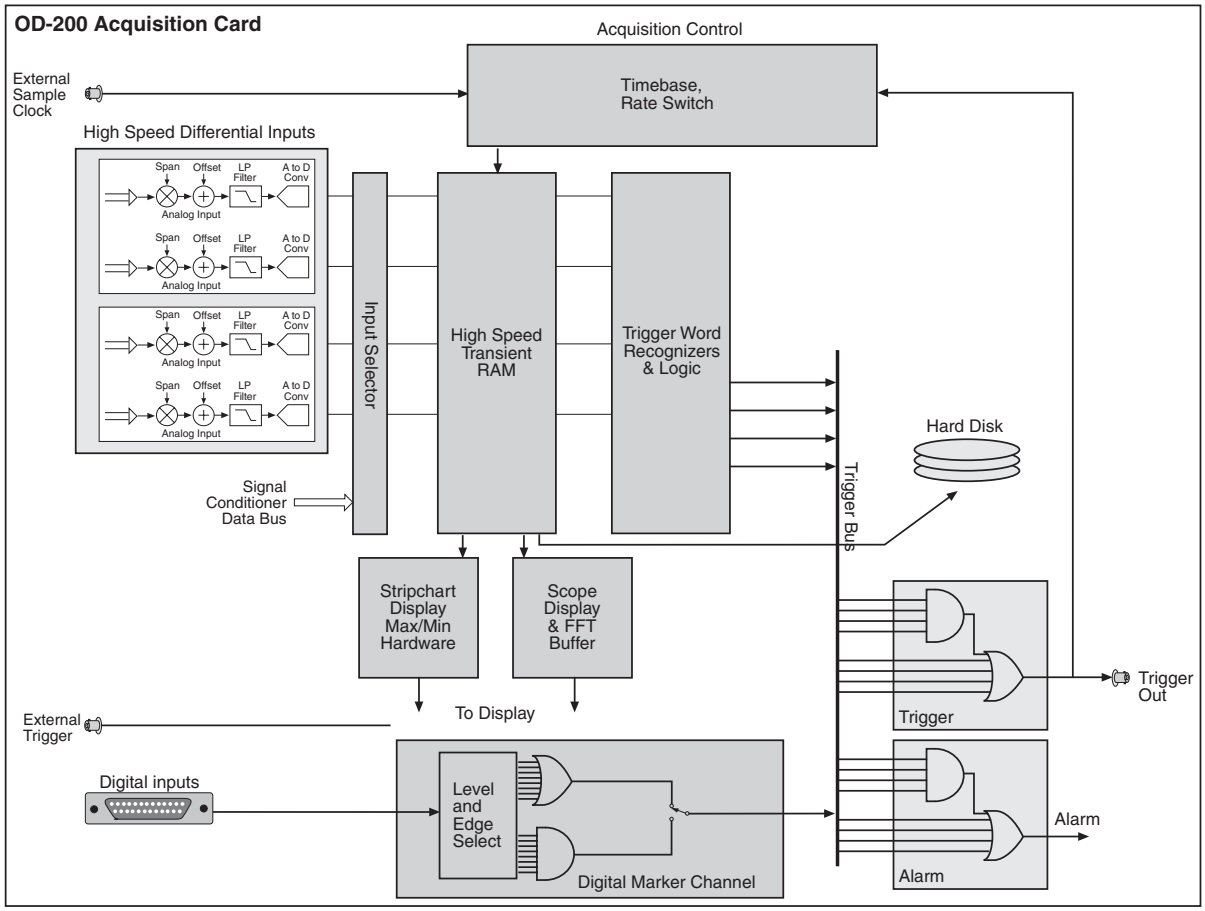
Each OD-200 card contains transient capture memory of 2 MS or 8 MS per channel, as well as a large hard disk for mass storage. The transient RAM acts as a large data buffer, accumulating high speed trigger events and writing them to disk as quickly as possible. Sophisticated control hardware and software allows the entire memory contents to be written to disk within a few seconds, so your transient capture is not limited by the RAM size. If triggers are not occurring constantly, an unlimited number of triggers can be captured at high speed and spooled to disk.

An on-screen indication of Available Memory percentage is provided so you can monitor the memory use in your application. At rates of 500 kS/s or below, the OD-200 can record continuously and the transient RAM never fills. At rates of 1 MS/s and greater, you may see the Available Memory dip momentarily as triggers are captured, then quickly written to disk. If the transient memory ever fills, recording simply continues at the Slow Acquisition Rate (up to 200 kS/s) until memory becomes available. This unique and powerful combination of transient and streaming recording assures that no significant event is ever lost as long as space remains on the acquisition disk.

While the OD-200 is provided with high-speed input amplifiers, it can also accept the 100 kS/s signals from any of the OD-100 signal conditioners (except thermocouple) for versatility and convenience in connecting to your transducer signals.

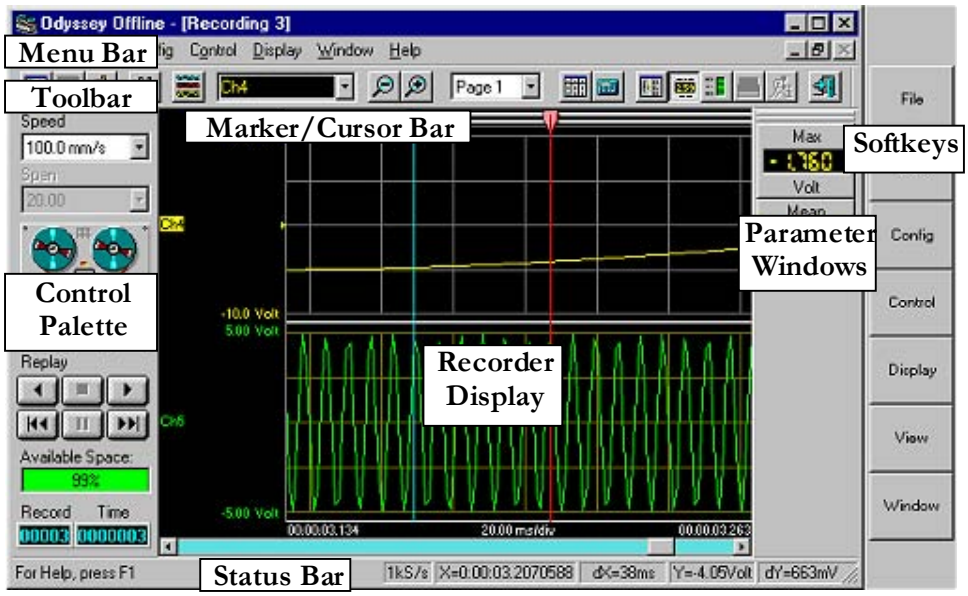
The OD-200 signal conditioners provide differential amplifiers with a wide input range of 20 mV to 100 V. A user selection of four analog low-pass filters are provided before the ADC. If aliasing is not a concern in your application, the filters can be bypassed to provide a wide 5MHz analog bandwidth. As with the OD-100 amplifiers, Nicolet selected multi-pole Bessel filters for their excellent time-domain characteristics.

A block diagram of the OD-200 board is shown on the next page.


OD-200 Acquisition Card
Acquisition Control
External Sample Clock
Timebase, Rate Switch
High Speed Differential Inputs
Span
Offset
LP Filter
A to D Conv
Analog Input
Input Selector
High Speed Transient RAM
Trigger Word Recognizers & Logic
Hard Disk
Trigger Bus
Signal Conditioner Data Bus
Stripchart Display Max/Min Hardware
Scope Display & FFT Buffer
To Display
Trigger
Trigger Out
External Trigger
Digital inputs
Level and Edge Select
Digital Marker Channel
Alarm

Organization of the Odyssey Environment

The main features of the **Recorder Window** are shown below. If you are not already familiar with Windows, please refer to your Windows manual. You must have a working knowledge of Windows before you begin using your Odyssey software.



The **Menu Bar** functions as in other Windows applications. Menus are opened by clicking on the menu name in the **Menu Bar**. Selections from the open menu are made by clicking on the item listed.

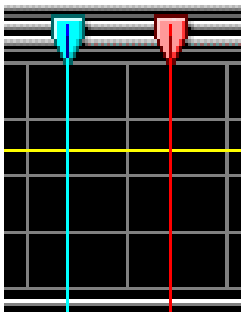
The **Toolbar** contains button shortcuts to menu commands. Select a tool command by clicking once. Click on the arrow to the right of the selection box to view the drop down menu. Click once on a channel name to choose that channel.

The **Control Palette** contains all the controls necessary to select speed and range, begin and end, and replay a recording forward or backwards.

The **Recorder Display** shows acquired data, recordings as they are made, and recordings you have saved for viewing at a later time, as well as displaying the cursors. The window can be split either vertically or horizontally and up to eight traces can be displayed in each pane of the window.

The **Status Bar** contains information about getting help, displays the acquisition rate, and the current cursor locations.

The **Cursor/Marker Bar** displays the markers placed in a recording. It also contains the cursor "handles" that indicate which is the active cursor. Markers appear as exclamation marks and the two cursors appear as boxes. Triggers appear as the letter "T" and bookmarks appear as small pages. When you click on a cursor and move it, it becomes the active cursor and becomes red. The blue cursor is the inactive cursor. The status bar indicates the cursor time and voltage, as well as the difference between cursors. Note that the cursor boxes can be located at the extreme edges of the Recorder Display. You can bring them on-screen by clicking on the "handles" and dragging them.



The Cursor/Marker Bar appears at the top of a recording.

Cursor Markers:

Cursor Handles

Trigger

Marker

Bookmark

The **Parameter Windows** display real-time measurement information that you select and configure for each channel (OD-100 only).

The **Softkeys** provide access to all menu commands from the front panel of the Odyssey.

All of the Display elements except the Menu Bar and Softkeys can be “undocked” and moved to any desired location on the screen. They can also be turned off in the Window menu to allow the maximum room for the Recorder Display.

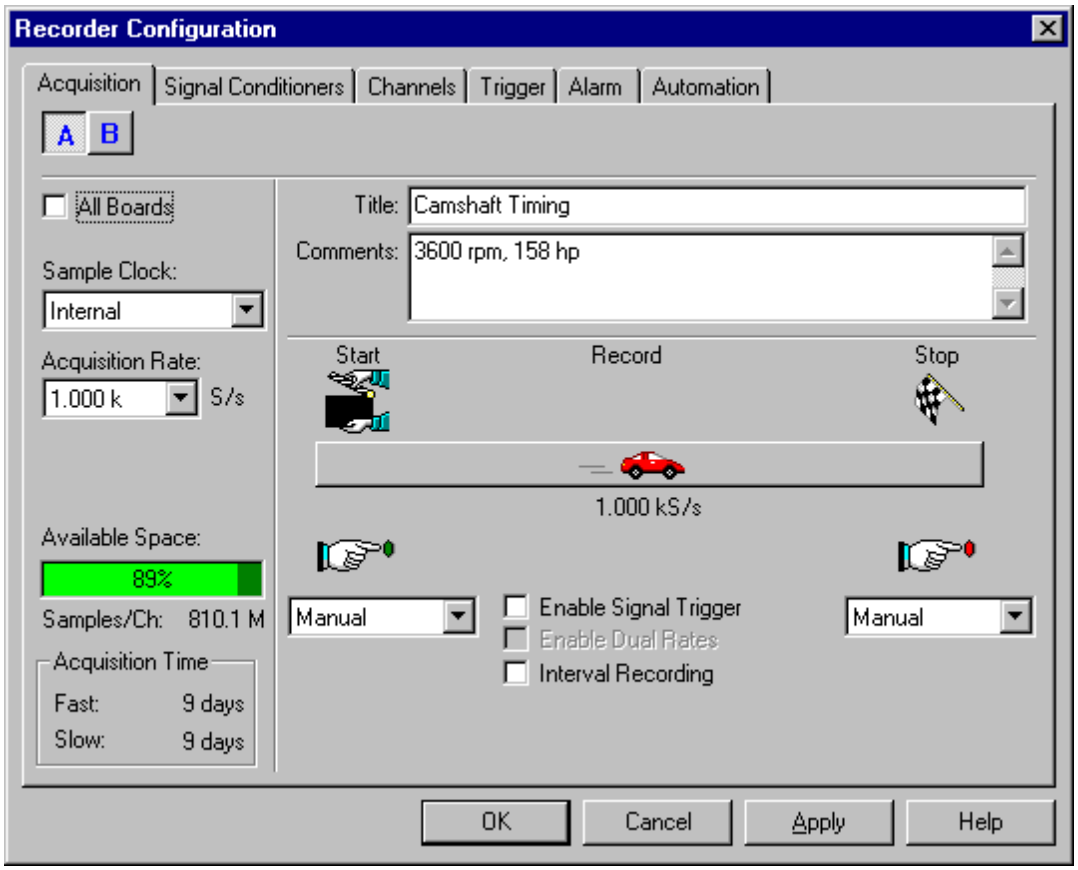
Odyssey Keyboard Shortcuts

Like all Windows programs, Odyssey menu functions are available through use of the keyboard ALT- key; for example, Alt – F calls the File menu, after which the letter O opens a recording. Several additional Odyssey functions are also available from the Windows keyboard using shortcut keys.

Numeric + key	Display Time Expansion
Numeric – key	Display Time Compression
Numeric = key	Return to original Time scale
Space bar	Cursor Values Display box on/off
Control – Space bar	Display Cursor Values at left of screen
Control – C	In trace display: copy current trace image to Clipboard In Cursor Values display: copy cursor values to Clipboard
Control – 1	Select Display Page 1
Control – 2	Select Display Page 2
Control – 3	Select Display Page 3
Control – 4	Select Display Page 4
PgUp	Select Previous Display Page
PgDn	Select Next Display Page
Control – G	GoTo dialog
Control – B	Search for next Bookmark
Control – Shift – B	Search for Previous Bookmark
Control – M	Search for next Mark
Control – Shift – M	Search for Previous Mark
Control – T	Search for next Trigger
Control – Shift – T	Search for Previous Trigger
Control – L	Search for next level crossing
Control – Shift – L	Search for previous level crossing
Control – E	Search for next local extreme (peak or valley)
Control – Shift – E	Search for previous local extreme
Ctrl + '*'	Autoscale trace vertically
Ctrl + '+'	Expand trace vertically
Ctrl + '-'	Compress trace vertically
Ctrl + '/'	Restore original vertical trace scaling

Configuring the System

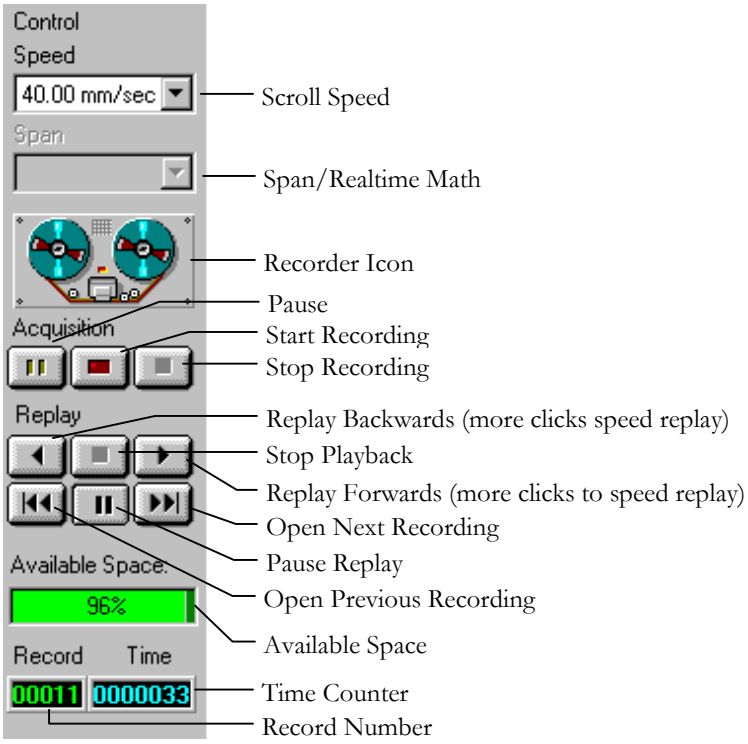
Before you begin acquiring data, you must first configure the system. Your Odyssey system is configured using the commands in the ***Config*** menu. Using these commands, you can establish a system setup for your test. The configuration menus are arranged as tabs within a main **Recorder Configuration** dialog. Each tab allows you to enter different settings for your test. It is recommended that you begin with the **Acquisition** tab and move consecutively through the other configuration tabs. These tabs use easy-to-understand graphics, such as a race car to represent fast acquisition and a turtle to represent slow acquisition. Once you have configured all these tabs you can save the setup for later use.



Chapter 8 contains a detailed discussion of all the ***Config*** dialogs.

Acquiring Data

Using your Odyssey is easy since many of its functions are designed to look like familiar controls on a tape recorder. For example, the **Control Palette** provides easy access to all acquisition and replay commands in the form of "tape recorder" buttons. Details of Control Palette operation are found in Chapter 5.

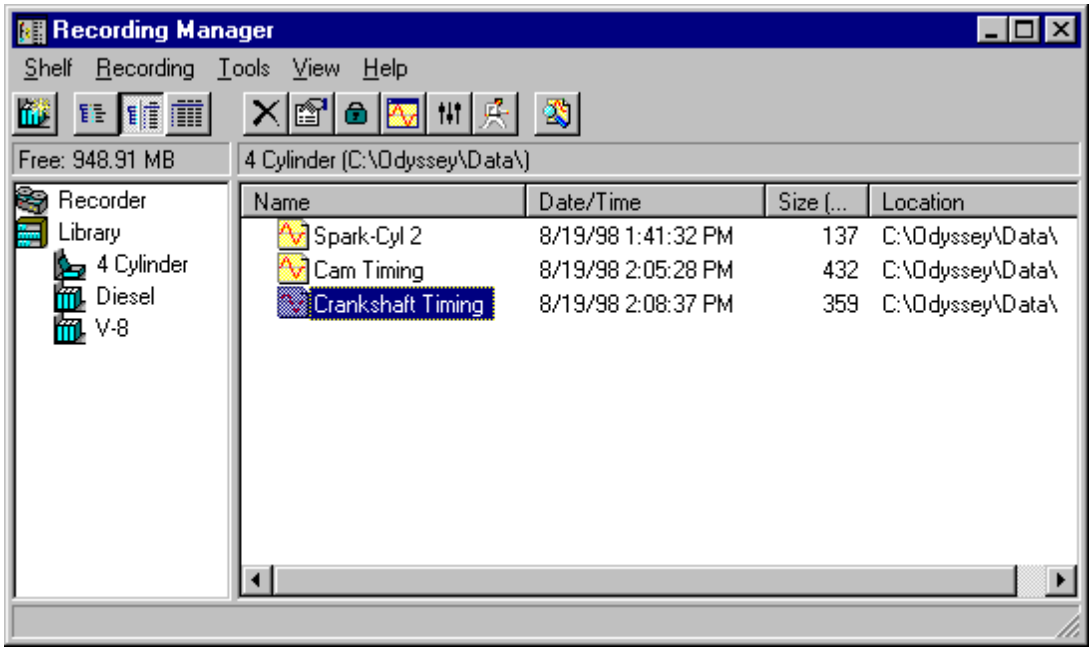


Analyzing Data

Your Odyssey contains its own operating software and, if you purchased the option, ProView, imPRESSion and/or SpectraPro software. With Windows multitasking, it is simple to switch from one application to the other and you can easily post data from Odyssey using the toolbar "Analyze" button. If you prefer to use another analysis software, Odyssey exports data in numerous popular formats.

Saving Data

Organizing and saving recordings is simple. Using the **Recording Manager** dialog, you can organize your recordings in a series of **Shelves** you create and place within a main **Library**. Each Shelf refers to a Windows directory anywhere on your Odyssey hard disk or on your network. Drag and drop copying of recordings from one **Shelf** to another and from the **Recorder** to a **Shelf** makes organization easy. The Recorder refers to the Odyssey acquisition disks which can hold a maximum of 511 recordings. A Shelf can hold any number of recordings.



Viewing Data

The **Recorder Display** provides the information you need in an easy to understand format. You can display multiple channels on each of 4 display pages in your Odyssey. Cursors are provided to make data measurements easy and markers can be placed in the recording to enable you to search for events. Waveform data is displayed in real-time as it is recorded. Display speed and channel settings can be changed while recording. One real-time parameter per channel can also be displayed numerically. Data can be captured for inspection in a separate window while recording continues; captured data can be zoomed, post-processed in ProView, and printed. Data can be played back at a constant rate, forward or backward, or manually scrolled with the **Scroll** knob on the front panel of the Odyssey.

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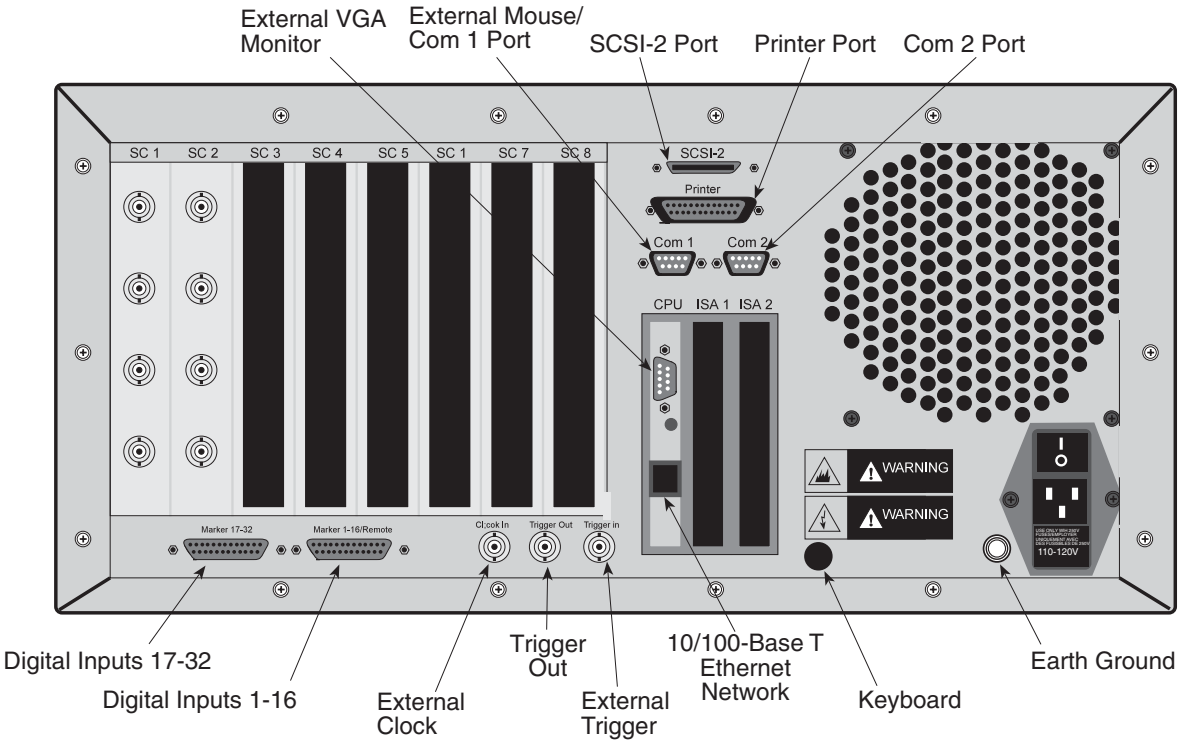
Chapter 4: Hardware

Setting Up the System

Your Odyssey comes complete with all the cables necessary for the configuration you ordered. In addition, your Odyssey is shipped with a keyboard, mouse, and main power cord.

Since each Odyssey can be ordered with different options, use the following diagram to connect the cables that apply to your system.

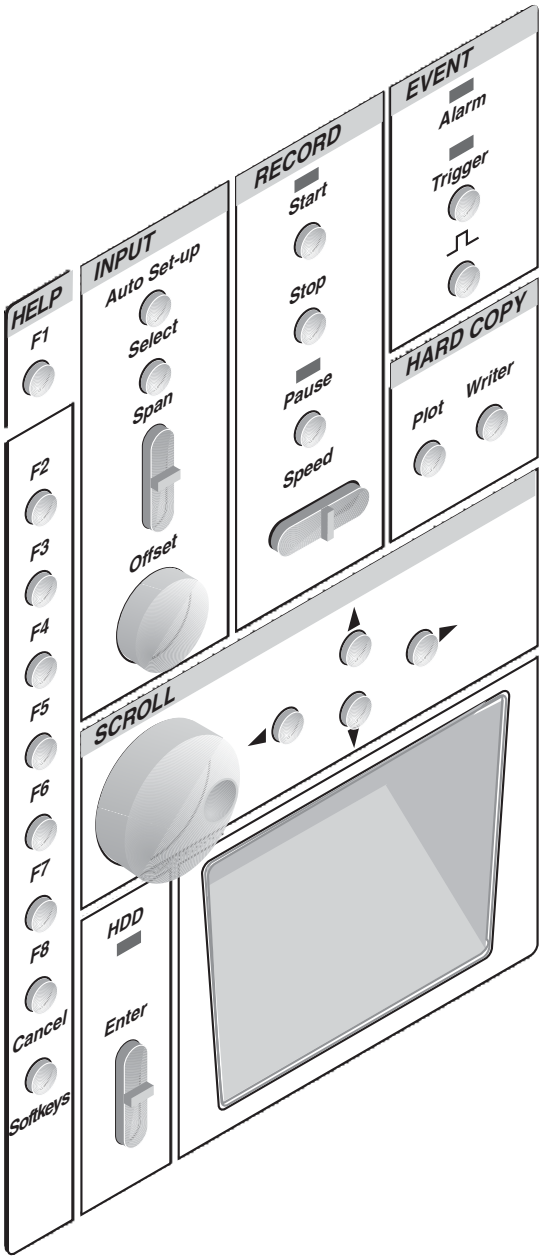


Refer to Appendix B for connection information on the digital inputs.

The Odyssey may be operated without a keyboard or external mouse attached, unless you are connected to a network and a log-in is required. If no keyboard is connected during power-up, the CPU will beep several times as a caution.

Using Front Panel Controls

The front panel controls on the Odyssey are clearly labeled. Refer to the illustration below to locate the controls.



Help: Press to obtain context sensitive help.

Auto Set-up: Press to automatically adjust input span and DC offset for each active channel.

Select: Press to make the next channel in the display the active channel.

Span: Push up to increase the span (e.g. from 10V to 20V); push down to decrease the span.

Offset: Turn to the right move the trace up; turn to the left to move the trace down. The baseline is automatically corrected.

Start: Press to begin acquiring and recording data. This data is stored on the Odyssey's acquisition disks and you can choose to review the recording or save the recording to a shelf in the library using the **Recording Manager**.

Stop: Press to end data acquisition in both the recording and pause modes.

Pause: Press to view, but not record the data. This allows convenient setup and monitoring without consuming disk space.

Speed: Press (+) to increase scroll speed; press (-) to decrease scroll speed. Does not affect sample rate, which is set in the configure acquisition menu.

Alarm: LED lights when user-defined alarm condition is detected.

Trigger: LED lights when a trigger event takes place. Upper button in this area enters a manual trigger event.

Marker (⎍): This button places a mark in the record which can be searched later. A small symbol is displayed at the top of the display. Any number of marks may be entered in a recording.

Writer: Enables the optional stripchart writer, if installed.

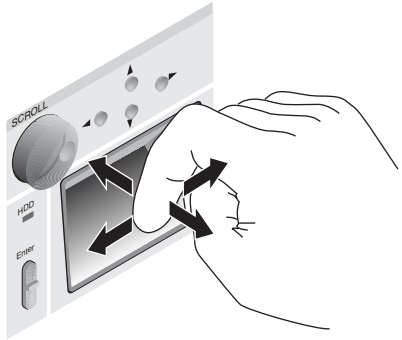
Plot: Press to print a hard copy of the display.

Scroll: Turn to the right to move forward in the current recording, turn to the left to move backward in the current recording.

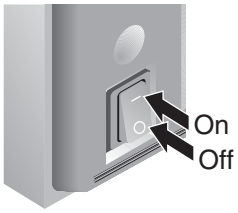
Other Controls

Softkeys: Described in the following section.

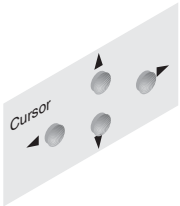
Touch Pad (on the lower right of the Odyssey front panel): A ruggedized mouse pad suitable for dirty or dusty environments where a conventional mouse cannot be used. Slide your finger across the **Touch Pad** to move the mouse pointer on screen. Slide to move the cursor, tap on the **Touch Pad** to "click" the mouse, or tap in the upper right corner to perform a right mouse button click. A tap-and-drag motion moves items or creates a selection box, like the click-and-drag action of a conventional mouse.



Power On/Off (on lower left of the Odyssey front panel): Push up to turn power on, push down to turn power off. To protect valuable data in your applications, always use the **Shut Down** command from the Windows Start menu before switching off power. The Odyssey and its data are protected from power loss, but your other Windows programs may lose information if power is lost while they are running.



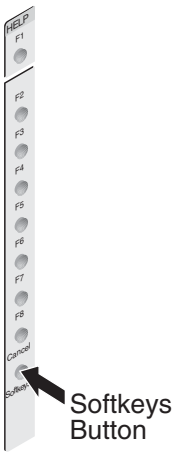
Cursor controls move the on-screen cursors left and right. The up and down buttons select the active cursor.



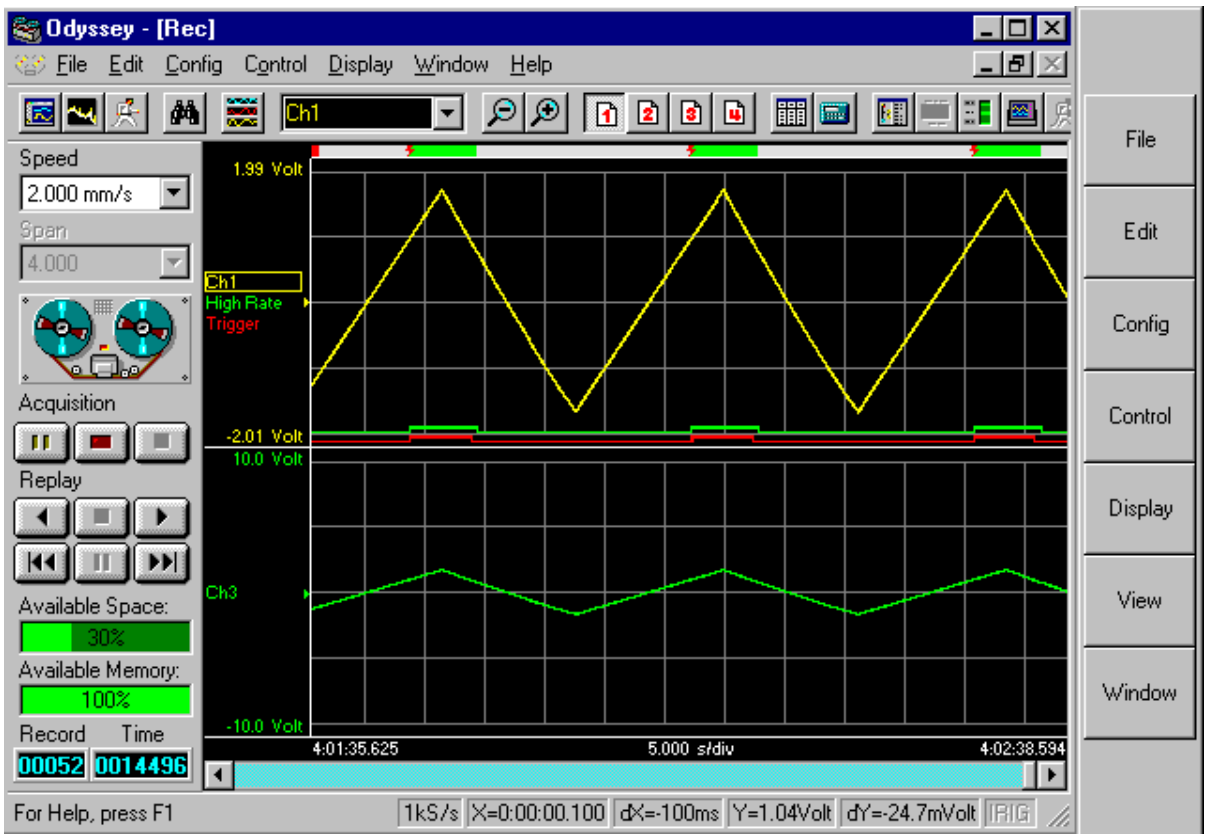
Using the Softkeys

The **Softkeys** allow you to access most of the Odyssey menu commands from the front panel of your Odyssey.

To show the **Softkeys**, press the **Softkeys** button on the front panel.

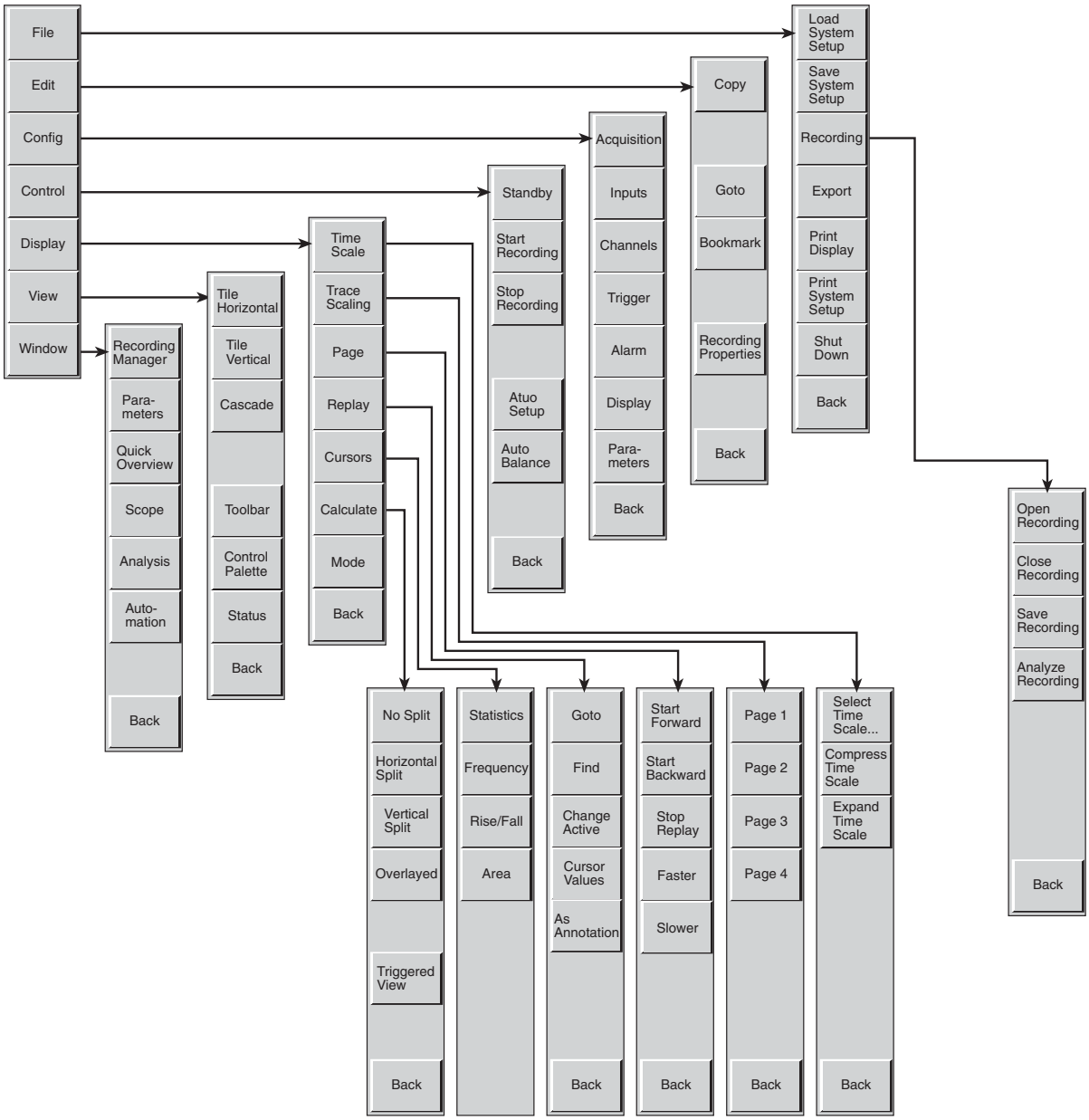


The **Softkeys** appear at the right side of the Odyssey window.



The **Softkeys** are arranged exactly like the Odyssey menus. The first set of keys that appear are the menu names. You can access all the commands for that menu by pushing the button on the front panel next to that menu name. (Press the **F2** button on the front panel to select the **File** key in the first menu, for example.) To return to the previous set of keys, use the **Back** key or **Cancel** key.

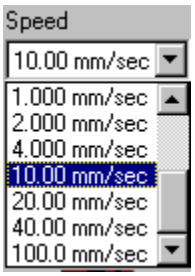
The following chart shows the progression of menus for the **Softkeys.**



Chapter 5:
Using the Control Palette

The **Control Palette** contains the controls necessary to select speed and range, begin and end, and replay a recording forward or backwards.

Scroll Speed



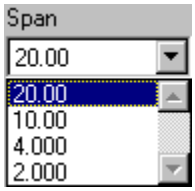
Select the scroll speed for the **Recorder Display** by clicking on the arrow to the right of the box and then clicking once on the speed value in the drop down menu that appears.

This selection has the same effect as using the **Speed** bar on the front panel.

Changing the scroll speed does not affect the data acquisition rate, which is set in the **Acquisition** tab of the **Recorder Configuration** dialog.

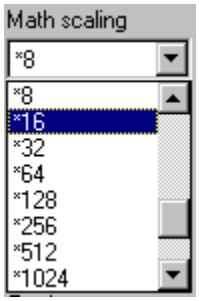
When using External Clock, this control changes to Units/division in the user-specified units.

Span/Realtime Math



Select the span for the selected channel in the **Recorder Display** by clicking on the arrow to the right of the box and then clicking once on the span in the drop down menu. This control is available only in Pause or Record mode. It is grayed out when the recorder is stopped.

This selection has the same effect as using the **Span** bar on the front panel.



If you enabled **Realtime Math** in the **Channels** tab of the **Recorder Configuration** dialog, **Math scaling** replaces **Span** in this area. Select a scale for the **Recorder Display** by clicking on the arrow to the right of the box and then clicking once on the math scaling value in the drop down menu.

Recorder Icon

The **Recorder Icon** provides a visual indicator of when a recording is in progress or being reviewed. The "tapes" turn when the recorder is on and when you are reviewing a recording. The direction the tapes turn indicates whether you are replaying a recording forwards or backwards.

Click the right mouse button on the Recorder Icon to open the easy access menu. These commands are identical to those in the ***Config*** menu.

Acquisition

The **Acquisition** tools allow you to start a recording, place the system in Pause, or stop a recording or playback.

Click on the **Pause** button (on the left) to start displaying acquired data without creating a recording. This mode is ideal for setting up your signal conditioners and viewing inputs without consuming disk space.

Click on the **Start Recording** button (middle) to start recording and displaying data. Recording begins immediately, and settings are automatically saved along with the data. Note that the "tape deck" above starts turning when you start recording.

Click on the **Stop Recording** button (on the right) to stop displaying or recording data.

When a recording is stopped, Odyssey builds a table of timing and trigger links so that access during playback is very fast. This process takes more time on longer recordings or when many triggers are present. For a recording of many hours, or one that contains hundreds of triggers, a wait of a few minutes may be required.

These buttons have the same effect as the front panel **Start**, **Stop**, and **Pause** buttons and the ***Pause***, ***Start Recording***, and ***Stop Recording*** commands in the ***Control*** menu.

Replay

The **Replay** tools allow you to replay a recording or view other recordings stored in the **Recorder**.

Click the **Replay Backwards** button to replay the currently selected recording backwards slowly. Click additional times to accelerate playback.

Click the **Stop Playback** button to stop replaying the recording.

Click the **Replay Forwards** button to replay the currently selected recording forwards slowly. Click additional times to accelerate playback.

Click the **Open Next Recording** button to open the next recording stored in the **Recorder**.

Click the **Pause** button to pause replay of the current recording. Click this button again to resume playback at the same speed.

Click the **Open Previous Recording** button to open the recording previous to the current recording in the Recorder.

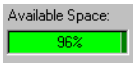
For browsing through a number of Recordings, it is more convenient to use the Odyssey **Recording Manager** provided in the **Toolbar** and under the **Window** menu.

Record Number

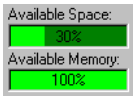
The **Record Number** area displays the number of the current recording.

This field is color coded to reflect the current acquisition state: red while recording, yellow while paused, or blue while reviewing. If you are reviewing a stored recording from the Library, the word "Disk" is displayed.

Space Available



The **Space Available** bargraph displays the percentage of space available for recording. It changes color and sounds an audible warning at 10%, 5%, 4%, 3%, 2%, and 1%.



If your system is equipped with the OD-200 high speed acquisition card, an additional display of **Available Memory** is provided. This indicates what portion of transient memory is available for capturing new triggers.

Time Counter

The **Time Counter** area shows the time in seconds of the area you are currently viewing in the **Recorder Display**. It refers to the seconds since start of the current recording. Moving the mouse pointer over this counter displays the count in hh:mm:ss format.

This field is color coded to reflect the current acquisition state: red while recording, yellow while paused, or blue while reviewing.

Right click the mouse button to open the quick access **Goto** command.

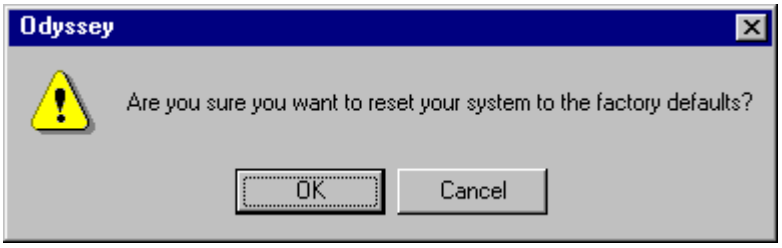
Chapter 6:
Using the File Menu

File Menu

The ***File*** menu contains commands that help you use and organize your setup and recording files. In addition, you can export recording files, print, and shut down from this menu. The following sections teach you to use each of the commands.

New System Setup

The ***New System Setup*** command resets all system setups to factory defaults. If you select this command, the following dialog appears allowing you to decide whether to reset your system. Click **OK** to reset your system or **Cancel** to exit without changing the current system setup. All channels are set to their highest voltage range, with Signal Conditioner 1 routed to channel 1, etc. The acquisition rate is set to 1 kS/s without triggers or alarms.



Load System Setup

The ***Load System Setup*** command opens a dialog that allows you to select a system setup file to load.

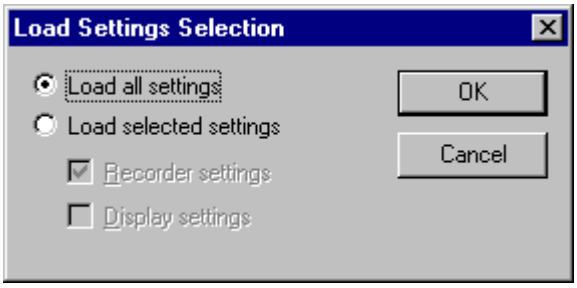
Each Recording you make contains all information about the system setup, so you can quickly load the exact settings used on a previous test by selecting that test.

You may also save System Setup files separately which contain only the recorder and display settings.

To load a system setup:

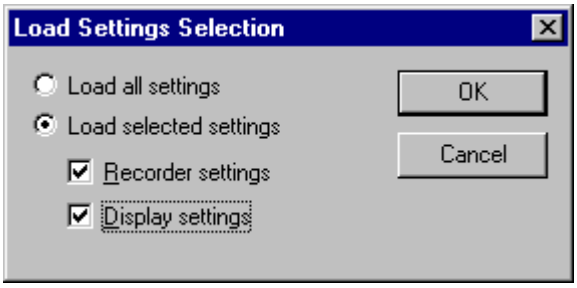
1. Use the standard Windows controls at the top of the dialog to find the setup file to load.
2. Click on the file to select (highlight) it.
3. Click **Open** to load the setup or **Cancel** to exit the dialog without changing the current system setup.

Another dialog appears, allowing you to select settings to load.



To load both the recorder and display settings from the currently selected recording:

1. Click **Load all settings**.
2. Click **OK** to exit the dialog and load the settings or click **Cancel** to exit the dialog without changing the current settings.



To load selected settings:

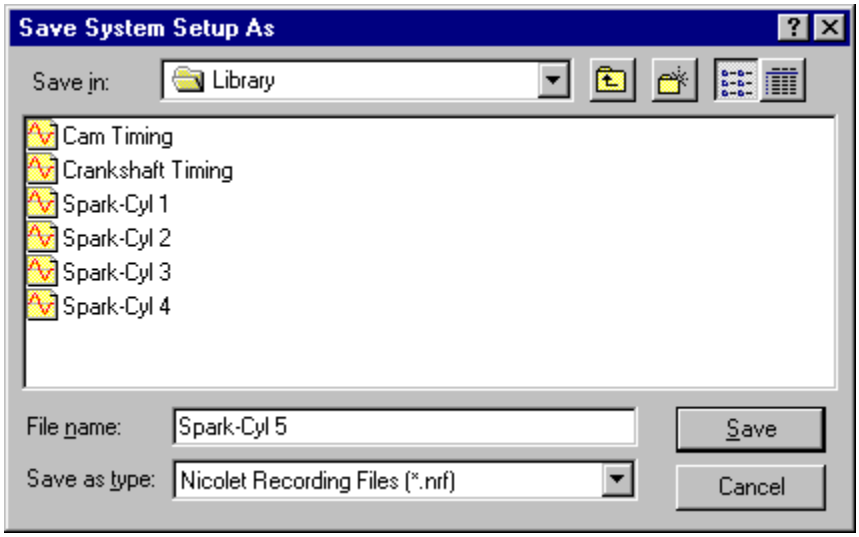
1. Click **Load selected settings** and select either **Recorder settings**, **Display settings** or both.
   Recorder settings include all acquisition, signal conditioner, channel, trigger, alarm and automation settings.
   Display settings include only the composition of the display pages.
2. Click **OK** to exit the dialog and load the settings or click **Cancel** to exit the dialog without changing the current settings.

Save System Setup

The ***Save System Setup*** command opens a dialog that allows you to save the current system setup.

This command creates System Setup files which contain all the recorder and display settings.

This function is not frequently required, because each Recording you make contains all information about the system setup. You can quickly restore the exact settings used on a previous test by loading the System Setup from that test. Typical uses for Save System Setup are when you have made some settings for a test in the future, or when you wish to keep an extra copy of the settings for a standardized test.



To save a system setup:

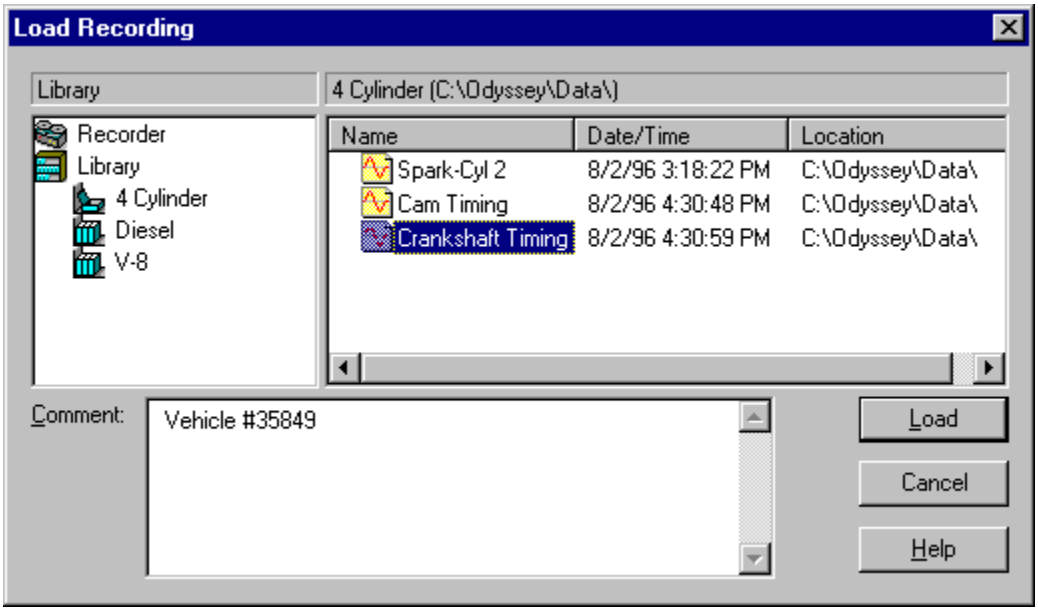
1. Use the standard Windows controls at the top of the dialog to find the directory where you want to store the setup file.
2. Type a name for the new setup file in the **File name** field. File names may be up to 250 characters long, and may contain spaces and punctuation marks.
3. Click **Save** to save the setup or **Cancel** to exit the dialog without saving the current system setup.

Open Recording

The ***Open Recording*** command opens a dialog that allows you to open a previously saved recording.

You can open multiple recording files to view and compare. Each one is displayed in a separate window. The Window menu allows you to select and tile display windows.

In addition to this dialog, you may also open any Recording file by dragging it into the **Recorder Display** from Windows Explorer or Odyssey Recording Manager.



To open a recording:

1. Click on the **Recorder** or a **Shelf** in a **Library** to locate the Recording you want to open. **Library Shelves** refer to specific Windows directories and are defined in the Odyssey Recording Manager. Refer to the *Recording Manager* section in Chapter 11 for more information.

2. View the contents of the **Recorder** or in the box to the right and use the information in the **Comments** field to locate the recording.

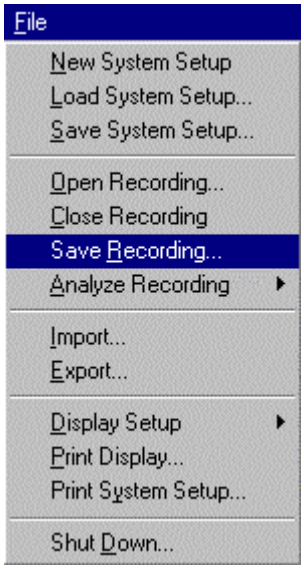
3. Click on the recording you want to open in the box to the right.

4. Click **Load** to open the recording, **Cancel** to exit without opening the recording, or **Help** to receive context sensitive help for this dialog.

Close Recording

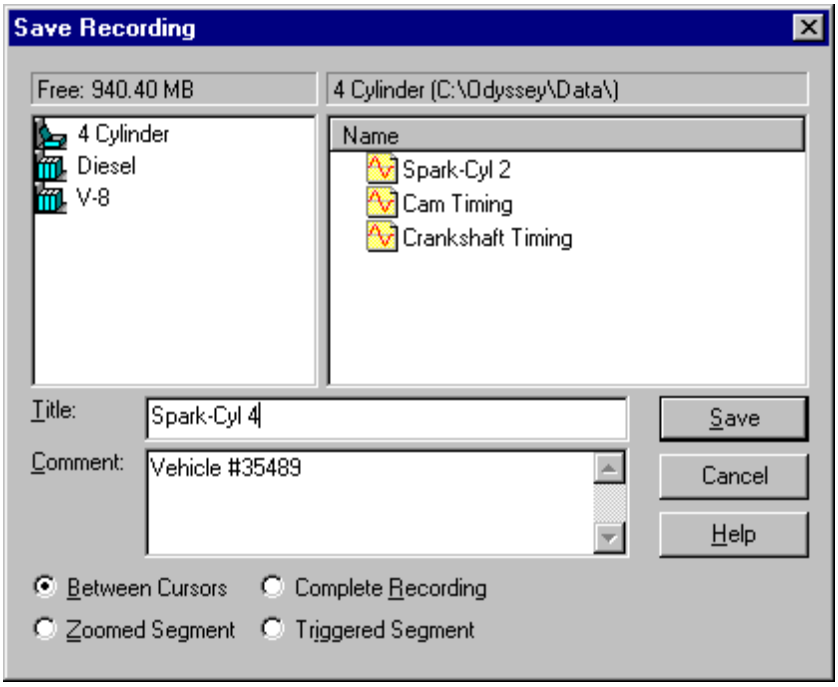
If you are displaying multiple Recordings in different windows, the ***Close Recording*** command closes the current (active) recording.

The window which displays newly recorded data cannot be closed. It is always on screen so you can monitor your Recordings.



Save Recording

The ***Save Recording*** command opens a dialog that allows you to save the current (active) recording from the Odyssey acquisition disks to any PC or network storage device.



To save a recording:

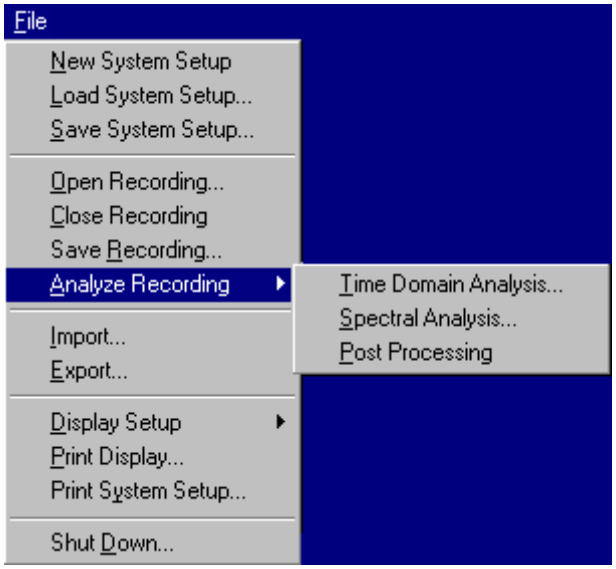
1. Select the **Library Shelf** (windows directory) where you want to store the recording. You can view the contents of the selected library in the **Name** field. To define a new **Library Shelf**, refer to the *Odyssey Recording Manager* section in Chapter 11.

2. Type a name for the saved file in the **Title** field.

3. If desired, enter a comment in the **Comment** field.

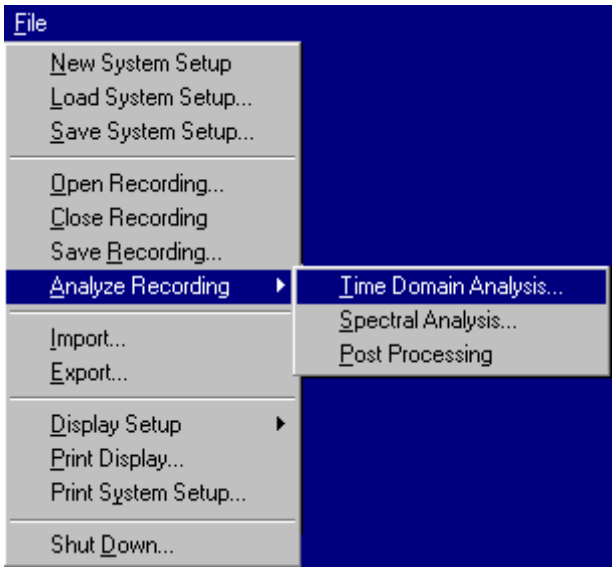
4. Select the portion of the recording you want to save. You can choose to save:
   - an area you defined by setting the cursors before selecting ***Save Recording*** from the menu,
   - the complete active recording,
   - the Triggered segment where the Active cursor is currently located. If this selection is grayed out, the cursor is not within a Triggered segment. (Hint: Use Control-T to move the cursor to the next Trigger.),
   - or a segment you select by zooming before selecting ***Save Recording*** from the menu.

5. Click **Save** to save the recording, **Cancel** to exit the dialog without saving the recording, or **Help** to receive context sensitive help for this dialog.



Analyze Recording

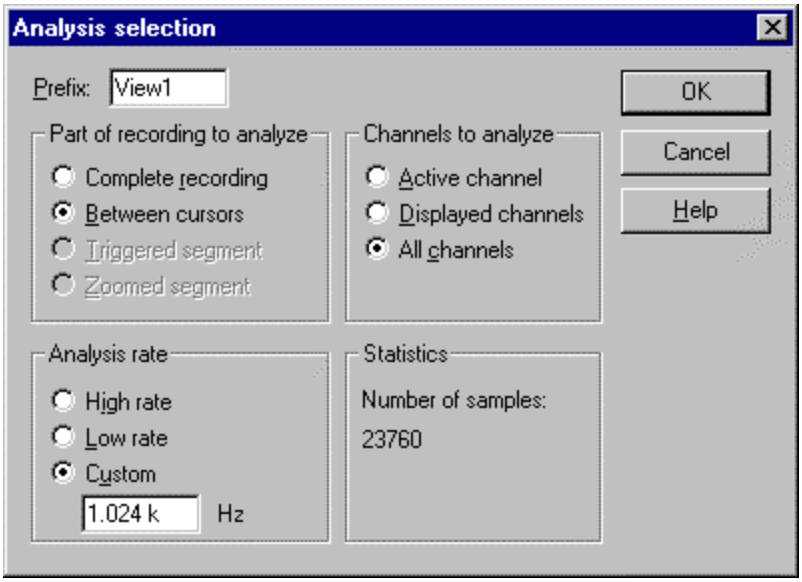
The ***Analyze Recording*** command opens a secondary menu that allows you to select options for analyzing the current recording in ProView, imPRESSion, SpectraPro, or other post-processing software. It also allows you to copy or export the recording or selected portions to a Windows directory. If any items are grayed and unavailable, it indicates the analysis option is not installed on your system.



Time Domain Analysis

The ***Time Domain Analysis*** command opens a dialog that allows you to select options for sending the current recording to either ProView or imPRESSion. If this menu item is grayed and unavailable, it indicates you have not selected a post-processing software, or ProView software is not installed on your system.

Selection between ProView and imPRESSion for post-run analysis is made in the ***Config…Preferences*** dialog.



To post the current recording for analysis in ProView, first assure that ProView is installed and is selected as your post-processing software in the ***Config…Preferences*** dialog.:

1. Enter a **Prefix** for the analysis in ProView. This will be the name of the View in ProView.

2. Select the **Part of recording to analyze** by clicking on one of the four options in the dialog. You can choose to analyze:

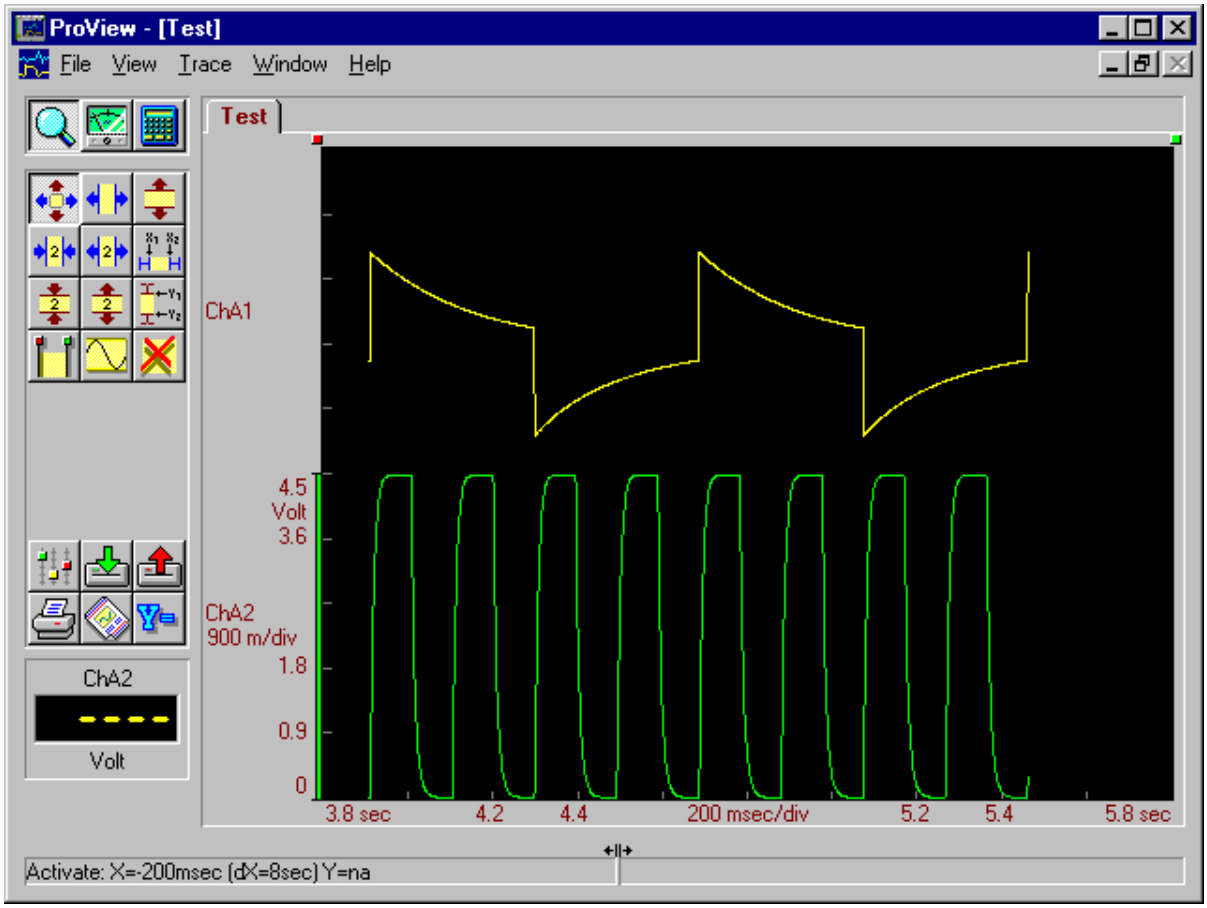
   - the complete active recording,
   - an area you define by setting the cursors before selecting ***Analyze Recording*** from the menu,
   - the Triggered segment where the Active cursor is currently located. If this selection is grayed out, the cursor is not within a Triggered segment. (Hint: Use Control-T to move the cursor to the next Trigger),
   - or a segment you select by zooming before selecting ***Analyze Recording*** from the menu.

3. Select the **Channels to analyze** by clicking on one of the three options in the dialog. You can choose to analyze:
   - only the active channel by clicking on a channel name in the display before selecting ***Analyze Recording*** from the menu,
   - all the channels currently displayed on screen,
   - or all the channels in the active recording.

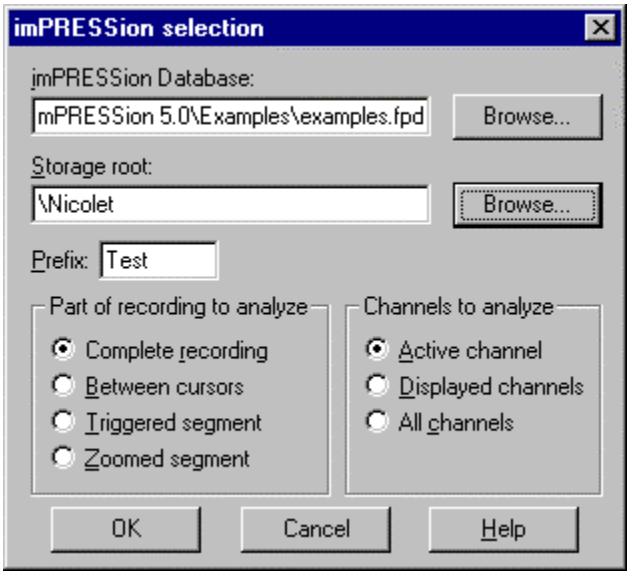
4. Select an **Analysis Rate** for the exported recording. Post high rate data or low rate data if the selected data segment has dual rate samples. The Custom button allows you to resample to any desired rate during the posting. It is not necessary to select an analysis rate if the data segment does not have dual rate samples.

5. The **Statistics** area shows the number of samples to be analyzed in ProView, based on the selections you made in the rest of the dialog.

6. Click **OK** to open ProView to begin analysis (as shown below) or **Cancel** to exit the dialog without exporting data.



Please refer to your ProView documentation for a more detailed description of its capabilities.



To post the current recording for analysis in imPRESSion, first assure that it is selected as your post-processing software in the ***Config..Preferences*** dialog.:

1. Enter the **imPRESSion Database** in which you wish to store your data. You may type in a new or existing file name, or **Browse** to any existing database. Databases can be anywhere on your PC or on your network, and have the extension "*.FPD.". It is convenient but not required to have imPRESSion installed on your Odyssey. Installed on any PC, imPRESSion can open database files anywhere on your network.

2. Optionally, enter the **Storage root** folder within the database where the data should be stored. This is an optional field: if you enter nothing your data will be stored at the root level of the database. We suggest the name \Nicolet to easily distinguish the data from other sources. You may also enter multiple subdirectory levels such as \Nicolet\Odyssey Data if desired to aid in organizing your data. The **Browse** button displays all existing folders in the selected database so you can select one.

3. Enter a **Prefix** to designate a folder for this transfer. The specified channels will be stored in this folder in the database. If you leave this name the same with each transfer, previous data will be overwritten and formulas you created can be updated with the new data. If you change this folder name with each transfer, you may store any number of data sets in the database. imPRESSion can analyze any of your data sets by making its folder the "Active Folder."

4. Select the **Part of recording to analyze** by clicking on one of the four options in the dialog. You can choose to analyze:

   - the complete active recording,
   - an area you define by setting the cursors before selecting ***Analyze Recording*** from the menu,

- the Triggered segment where the Active cursor is currently located. If this selection is grayed out, the cursor is not within a Triggered segment. (Hint: Use Control-T to move the cursor to the next Trigger),
- or a segment you select by zooming before selecting ***Analyze Recording*** from the menu.

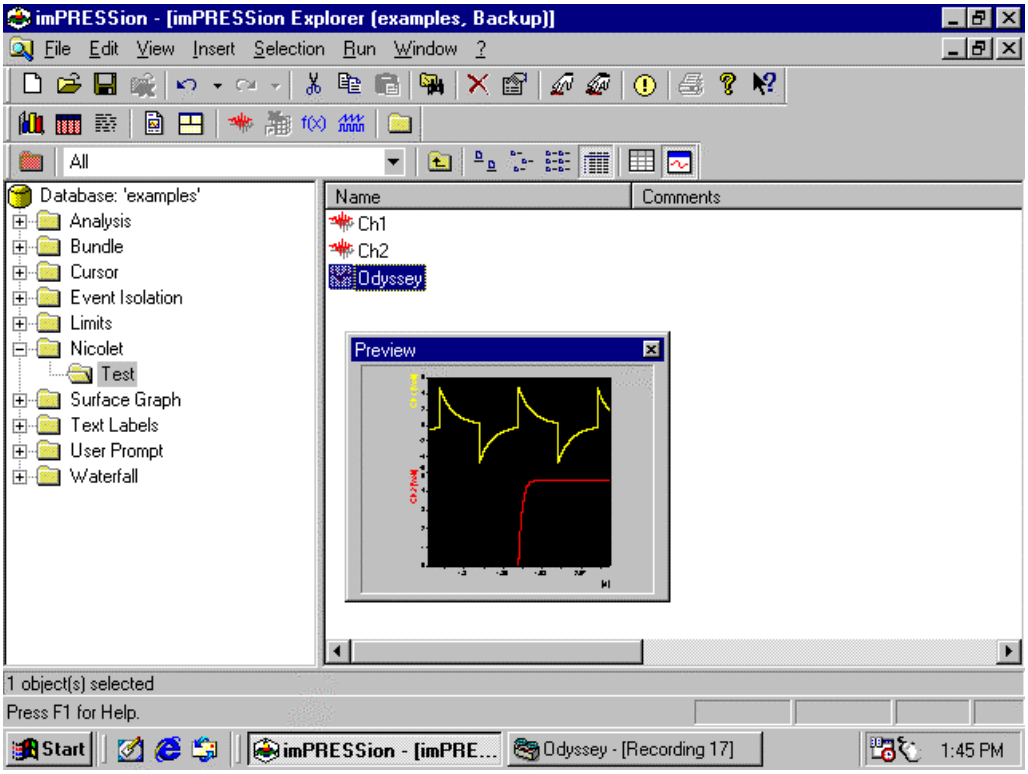
4. Select the **Channels to analyze** by clicking on one of the three options in the dialog. You can choose to analyze:
   - only the active channel by clicking on a channel name in the display before selecting ***Analyze Recording*** from the menu,
   - all the channels currently displayed on screen,
   - or all the channels in the active recording, including digital marker channels.

5. ImPRESSion supports multi-timebase data, so there is no need to choose between high rate and low rate data. If your Recording contains dual-rate triggered segments they will be transferred automatically including the exact timing information.

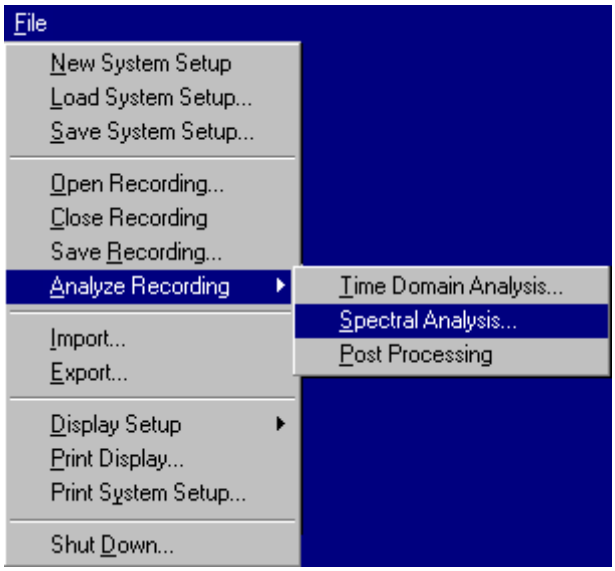
6. Click **OK** to send the data to the imPRESSion database or **Cancel** to exit the dialog without exporting data.

7. Start the imPRESSion application on your Odyssey or on another PC, and open the database you saved to. You may leave imPRESSion open and new data will appear in its database each time you post.

A sample imPRESSion screen containing Odyssey data is shown below. The **Storage root** is \Nicolet and the **Prefix** is Test. If you post Displayed Channels, a 2-D view containing those channels is created automatically with the name Odyssey.

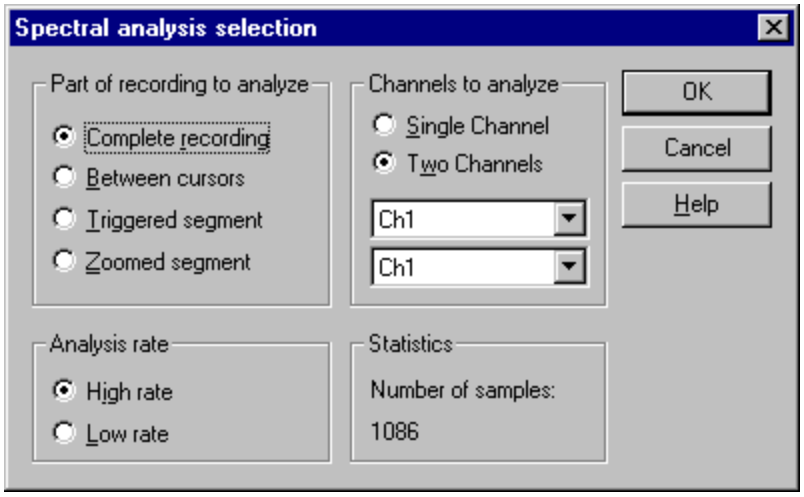


Please refer to your imPRESSion documentation for a more detailed description of its capabilities.



Spectral Analysis

The ***Spectral Analysis*** command opens a dialog that allows you to select options for exporting the current recording to SpectraPRO for analysis. If this menu item is grayed and unavailable, it indicates SpectraPRO software is not installed on your system.



To export the current recording for analysis in SpectraPRO:

1. Select the **Part of recording to analyze** by clicking on one of the four options in the dialog. You can choose to analyze:

   - the complete active recording,
   - an area you define by setting the cursors before selecting ***Analyze Recording*** from the menu,
   - the Triggered segment where the active cursor is currently located. If this selection is grayed out, the cursor is not within a triggered segment. (Hint: Use Control-T to move the cursor to the next trigger),
   - or a segment you select by zooming before selecting ***Analyze Recording*** from the menu.

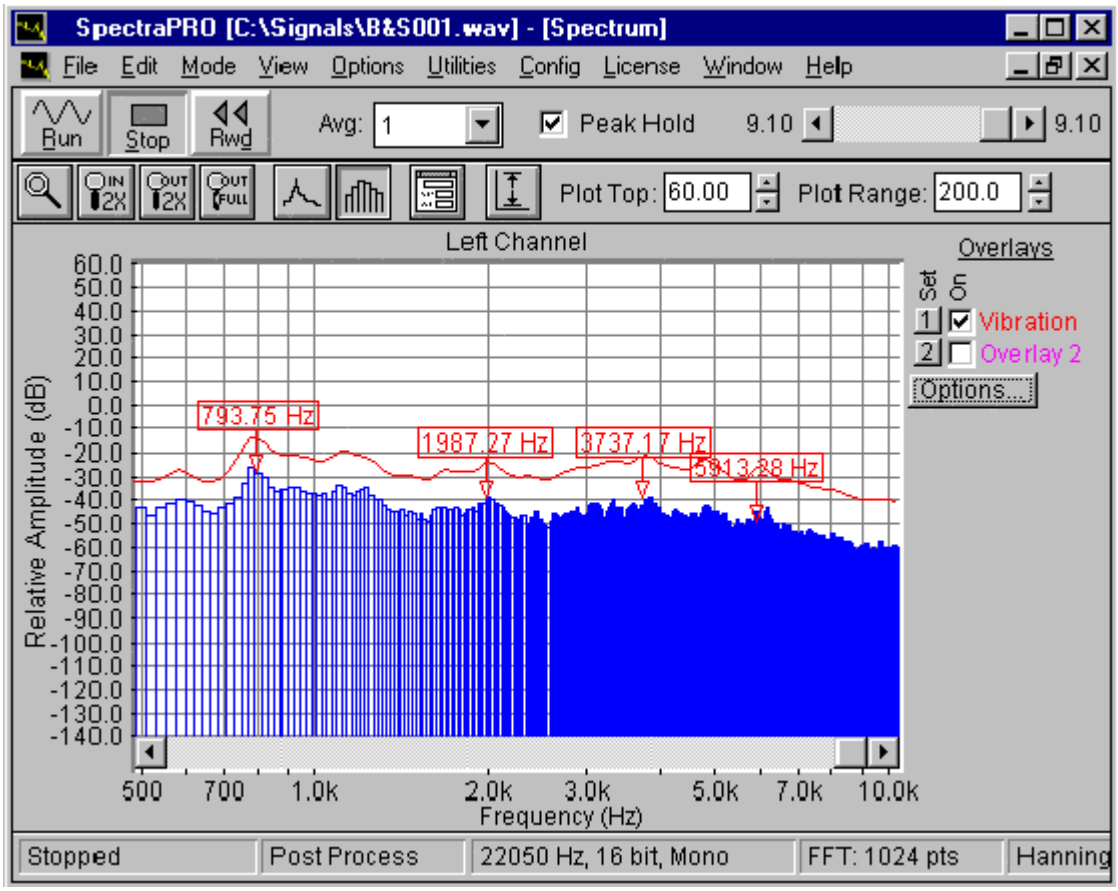
2. Select the **Channels to analyze** by clicking on one of the two options. You can choose to analyze:

   - A Single Channel selected from the drop-down menu of available channels,
   - or Two Channels, to allow two-channel spectral functions such as Transfer Function and Coherence.

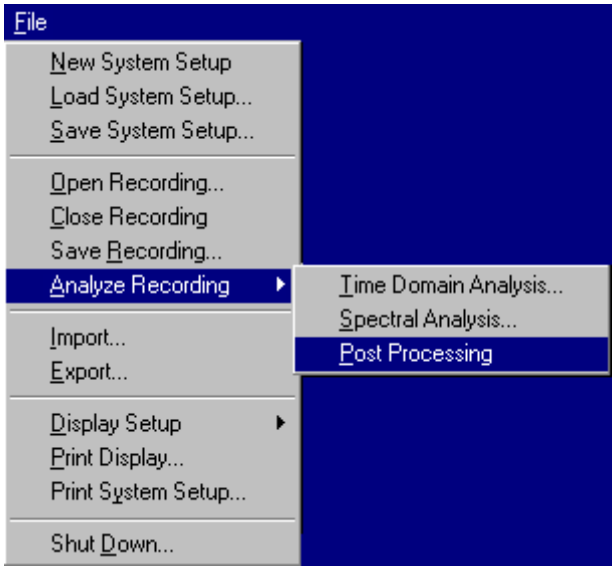
3. Select an **Analysis Rate** for the exported recording. Post high rate data or low rate data if the selected data segment has dual rate samples. It is not necessary to select an analysis rate if the data segment does not have dual rate samples.

4. The **Statistics** area shows the number of samples to be analyzed in SpectraPRO, based on the selections you made in the rest of the dialog.

5. Click **OK** to open SpectraPRO to begin analysis (as shown below) or **Cancel** to exit the dialog without exporting data.



Please refer to your SpectraPRO documentation for a more detailed description of its capabilities.

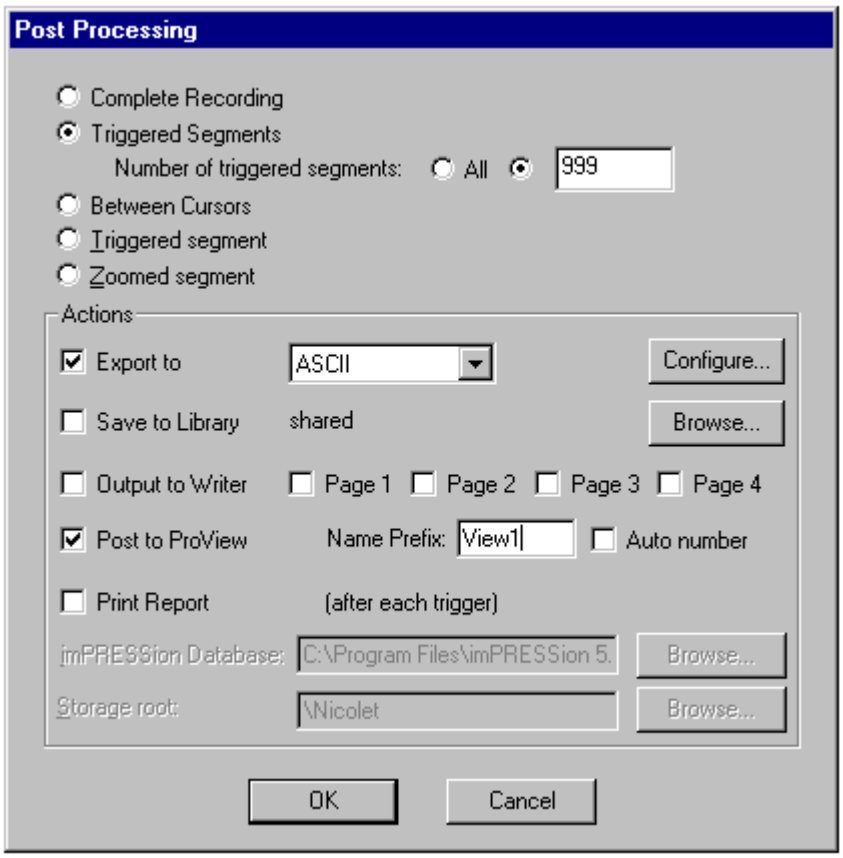


Post Processing

The ***Post Processing*** command opens a dialog to control Odyssey's powerful automation abilities. These convenient features allow a variety of actions to be automatically performed on the current Recording. With a few clicks, you can automate many common actions:

- Post a segment of interest to ProView or imPRESSion for analysis and automatically print a report,
- Copy the Recording or selections from it to a file server on your network,
- Export regions of interest in any of a dozen formats, or
- Plot, export or analyze each Trigger event in a long Recording.

For even more powerful automation facilities, the same actions can be applied to a number of past recordings at once by using the ***Post Processing*** command in the Odyssey Recording Manager (see Chapter 11). If desired, they can also be applied to each new recording as it is made by the ***Configure…Automation*** dialog (see the *Automation* section in Chapter 8).



To start a Post Processing action:

1. Select the part of the recording to analyze. You can choose to analyze:

   - **Complete Recording:** Post, store or plot the entire length of the current recording. A new file or plot will be generated for each recording. Each one contains all data from all channels. **Note**: Since the Odyssey can make huge recordings of thousands of Megabytes, use this option with care if you have a long-duration recording at high sample rates! Most versions of Windows are limited to a 2GB maximum file size. Copying large recordings may consume many minutes or hours, depending on the speed of your storage device.
   - **Triggered Segments:** Post, store or plot only the triggered segments within the current recording. Each triggered segment will be processed individually, including the pre-trigger and post-trigger data. An individual file or plot will be generated for each triggered segment. Data recorded between triggers will be ignored by the automated actions, saving storage space and time. To use the Triggered Segments option, the current recording must contain at least one triggered segment.
     In the **Number of triggered segments**, you may select **All** to act on every trigger in the recording, or enter a number to act on the first "n" number of triggers only.

     Note: A **Triggered Segment** contains pre- and post-trigger data and may be of any length. It includes the number of pre-trigger samples you specify, all samples recorded for as long as the trigger condition is true, and the specified number of post-trigger samples after the trigger condition goes false. If another trigger signal was detected before the

post-trigger time elapses, the segment also contains the additional triggered data and additional post-trigger data.

- **Between Cursors:** An area you define by setting the cursors before selecting ***Analyze Recording.***
- **Triggered Segment:** Operate on only the single triggered segment where the active cursor is located. If this selection is grayed out, the cursor is not within a triggered segment. (Hint: Use Control-T to move the cursor to the next trigger)
- **Zoomed Segment:** A segment you select by zooming before selecting ***Analyze Recording.***

2. Select the desired **Actions** to perform on the recording.

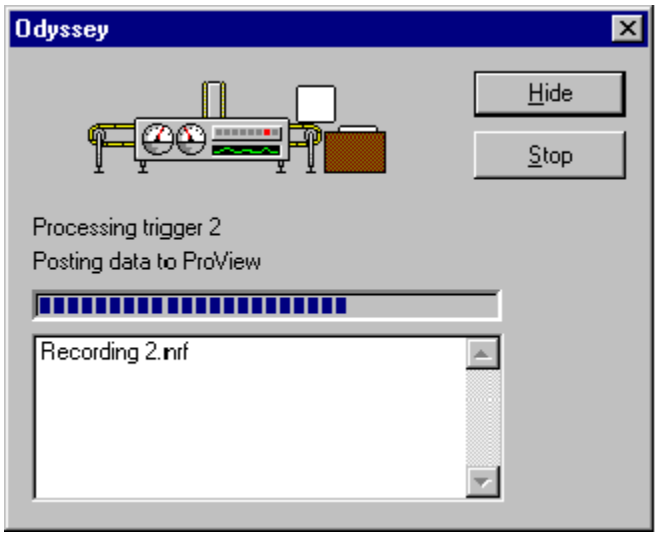
You can select any or all of the options for automatic actions.

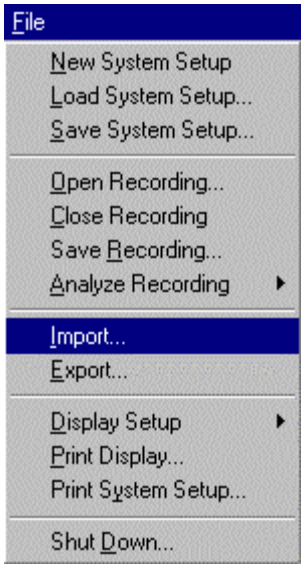
- **Export to:** Export data for use with other analysis programs such as SpectraPRO®, MATLAB® or DADiSP®. Select the type of export format from the pull-down menu. Each Recording or segment will generate a new file. (Some export formats allow only a single channel per file, and generate up to 32 files for each recording or segment.) Click on the **Configure** button to select the appropriate options for each export type such as file names and directories.
- **Save to Library:** Save the recording or segments to a **Library Shelf** which can be a Windows directory anywhere on your PC or network. Click the **Browse…** button to select from existing **Shelves**. To create a new shelf, use the **New Shelf** command in the Odyssey ***Recording Manager*** (see the *Recording Manager* section in Chapter 11).
- **Output to Writer:** Click this button to automatically plot the recording or segments to the currently selected stripchart writer. Click on the checkboxes for Pages 1-4 to indicate which display pages to print. To select printers, change writing speed, etc., refer to the ***Configure…Writer*** dialog (see the *Writer* section in Chapter 8).
- **Post to ProView:** This option is not available if ProView is not installed on your Odyssey. Posts data from the recording or segment to optional ProView analysis software. The recording name, length, sample rate, and other information is also provided to ProView. If desired, enter a **Name Prefix** of up to six characters to identify different data sets in ProView. Similar to a spreadsheet template, ProView recalculates its formulas each time new data is posted. Also similar to a spreadsheet, the ProView View, analysis formulas, and Report template must be set up in advance of the automated posting.
  If the **Auto number** checkbox is off, each posting will overwrite the previous one, so the last one processed is always available for quick inspection. Waveforms carry the same name with each posting, so each formula you define is recomputed with the new data. This option must be selected to allow automated analysis of different segments.
  If you click the **Auto number** checkbox, each new data set is added to the ProView Data Pool with a unique name. You can then define additional views and analyses of the various data sets. Note that since each new data set is assigned a unique incrementing name, your predefined ProView formulas will not act on the new data.

- **Print Report:** Analyze the waveforms and print a ProView report after posting. This lets you produce fully annotated reports from each recording or triggered segment with a template you define, a great convenience for repetitive testing such as Quality Assurance, Manufacturing, and Failure Analysis applications. This option is available only when **Post to ProView** is selected. The Report template must also be defined in advance of using the automated **Post Processing**, and the auto numbering feature must be off.
- **Post to imPRESSion:** If you have selected imPRESSion as your post-processing software, the dialog will include this option rather than the Post to ProView. Operation is similar to ProView, but additional fields are provided to specify the imPRESSion database and (optional) storage root folder to use. The imPRESSion database may be on your local PC or anywhere on your network. ImPRESSion software need not be installed on your Odyssey.
  If you post a number of triggers using the Autonumber feature, your imPRESSion formulas and report layouts may be used on any of them by making their folder the Active Folder.

3. Click the **OK** button to begin post processing, or the **Cancel** button to exit without processing.

   While the post processing actions are taking place, you will see a message box informing you of the progress. The multi-tasking Windows environment lets the automation take place while you analyze data or work in other applications. You can hide the status box by clicking the **Hide** button, or stop the automation in process by clicking **Stop**. To view the status box again after hiding it, click the **Automation Status** button on the right side of the Odyssey Toolbar.



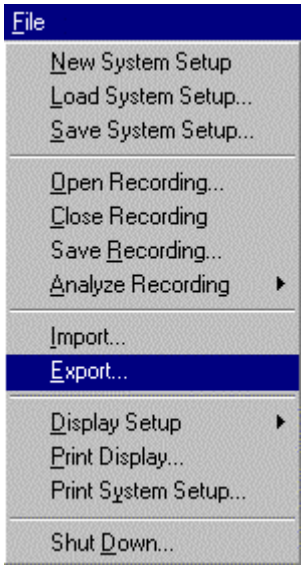


Import

The ***Import*** command allows you to import data from several sources:

- the Nicolet MicroPro ruggedized recorder (*.AMX files)
- Nicolet Recording files from other Odysseys or Visions (*.NRF files)
- Nicolet Distributed Recordings, synchronized multi-recorder files created by Odyssey Master Control or VisionNet Plus (*.DRF files)
- Nicolet Prism time-domain recordings (*.SIG files)
- Gould DAstar and Summit recordings (*.RAW)

Any of these files can then be viewed, zoomed, analyzed, printed or converted to other file formats.

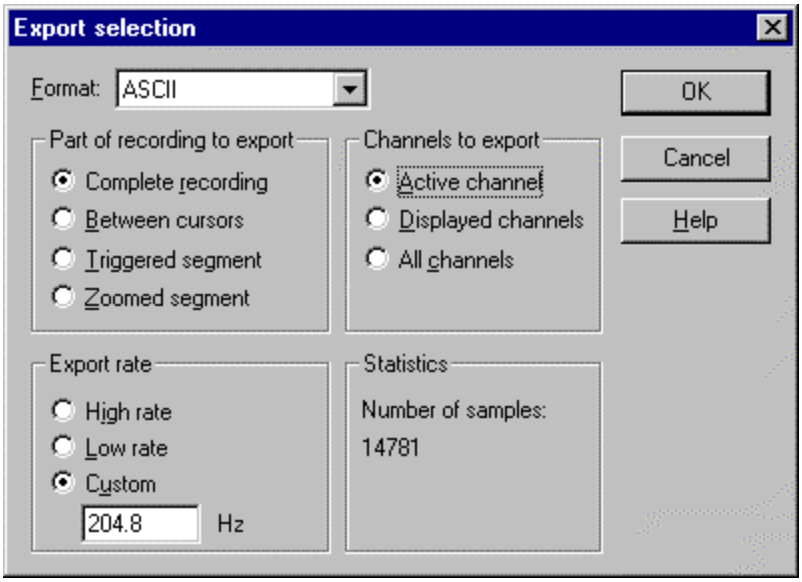


Export

The ***Export*** command allows you to export data in numerous popular formats for convenient use with other programs:

- ASCII
- DADiSP
- DATS
- DIA-PC
- FAMOS 3.0
- FlexPro 4.0
- H-P SDF 3.0
- ImPRESSion
- MATLAB
- nCode
- Somat EASE
- TEAM Data files
- UFF Type 58 ASCII
- UFF Type 58 Binary
- Wave Sound
- WFT

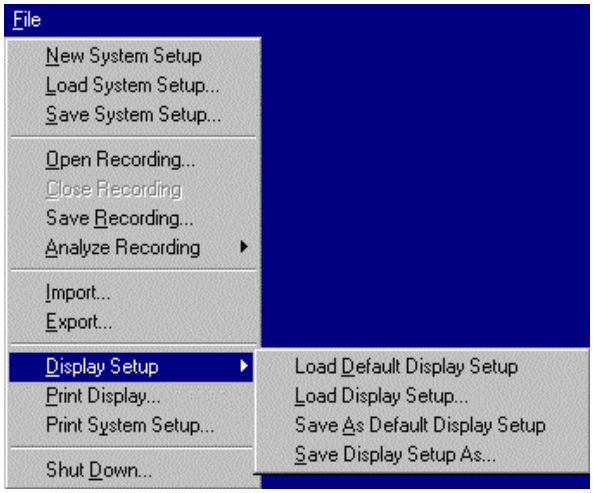
A description of the file types can be found in Appendix D, Data Interchange.



To export the current recording for use with other programs:

1. Select a **Format** for the data file from the pull-down list.
2. Select the **Part of recording to export** by clicking on one of the options in the dialog. You can choose to export:
   - the complete active recording
   - an area you define by setting the cursors before selecting ***Export*** from the menu
   - a triggered segment, including pre-trigger and post-trigger data
   - a zoom area you select by zooming before selecting ***Export*** from the menu
3. Select the **Channels to export** by clicking on one of the three options in the dialog. You can choose to export:
   - only the active channel by clicking on a channel name in the display before selecting ***Export*** from the menu,
   - all the channels currently displayed
   - all the channels in the active recording
4. Select an **Export Rate** for the exported recording. Select high rate data or low rate data if the selected data segment has dual rate samples. The Custom button allows you to resample to any desired rate during the export. It is not necessary to select an analysis rate if the data segment does not have dual rate samples.
5. The **Statistics** area shows the number of samples to be exported, based on the selections you made in the rest of the dialog.
6. Click **OK**

Export file formats are described in Appendix D. The Nicolet formats are fully detailed for direct use in your specialized post-processing needs.

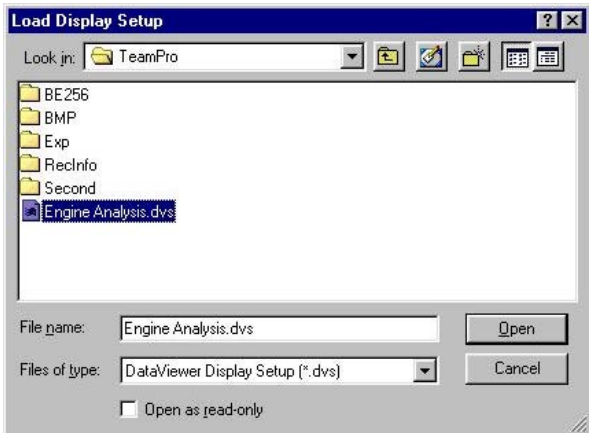


Display Setup

The ***Display Setup*** command opens a dialog allowing you to arrange the display parameters in the display window. Parameters include number of traces per panel, number of panels per page, panel heights, trace colors, and grid lines choices. Menu selections in the Display Setup command include:

Load Default Display Setup- loads predefined default display.

Load Display Setup…- offers selection of available display setup files (*.dvs).



Save As Default Display Setup- saves the current display as Odyssey's default setup.

Save Display Setup As…- saves the current display parameters as a *.dvs. Any number of display setup files may be saved by the user.

Most *.NRF data files have the display settings from their data recorder saved as header information with the raw data. Odyssey may open these files using either the original display settings or with a default setup file. The preferred display option is selected under the ***Config*** menu in the ***Preferences - Display*** screen. Using the default settings option allows you to analyze channels from different recordings without having to re-adjust each recording's display when it is opened.

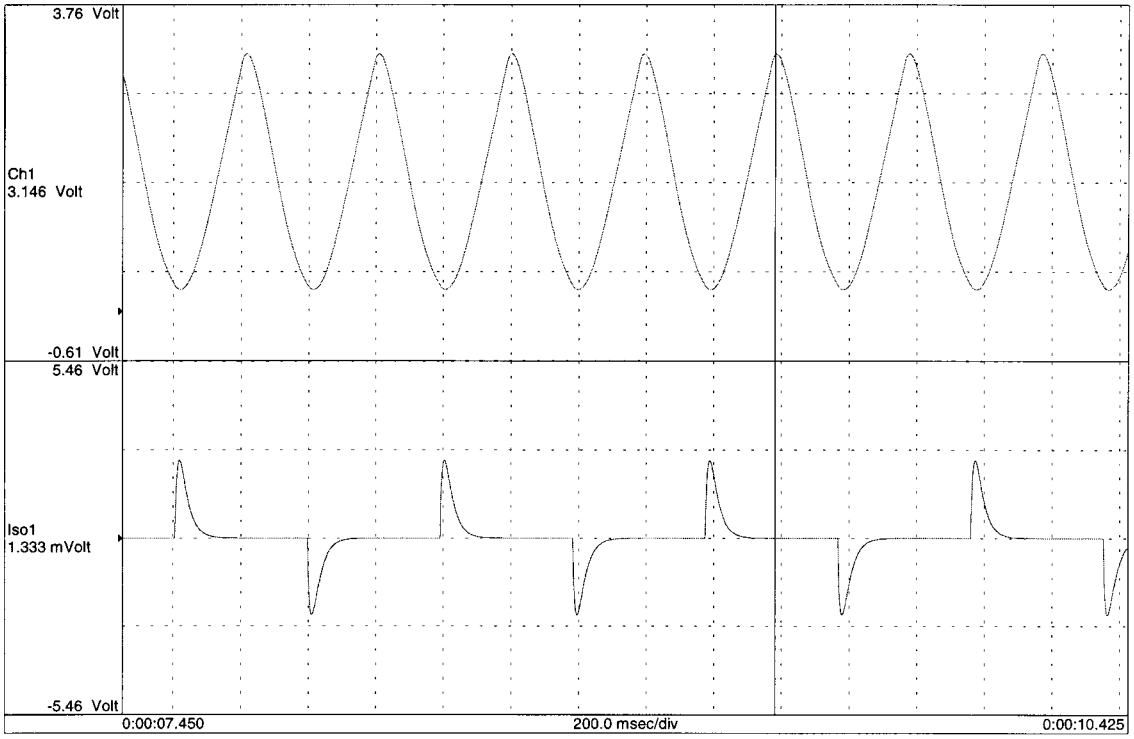
Print Display

The ***Print Display*** command prints a copy of the current **Recorder Display** on the printer connected to your Odyssey. The print out contains only the area you are currently viewing in the **Recorder Display**.

For continuous strip-chart output of a number of pages, refer to ***Config…Writer*** in Chapter 8.

A sample printout appears on the following page.

Recording 5



Nicolet Odyssey - Recording 5 Tuesday, December 10, 1996 15:33:20

Print System Setup

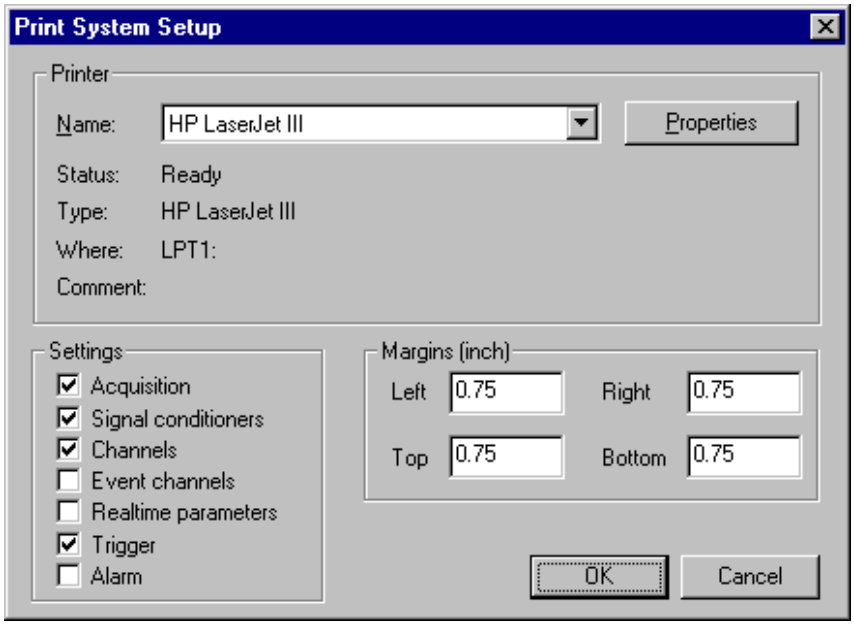
The ***Print System Setup*** command prints a report containing all the current system setups.

A dialog appears allowing you to select which setup items you wish to print.

Select the desired printer, the items to print, and the margins. When finished, click OK to begin printing.

A full report on a 32-channel system will occupy numerous pages.

A sample of output is shown below.



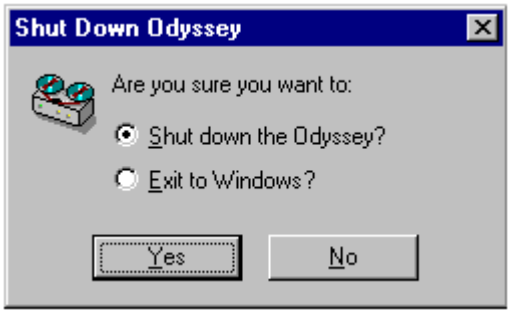

```
Odyssey                                Thursday, August 20, 2002 4:09:39 PM
                                   Acquisition settings
       Title        Camshaft Timing
       Comment      3600 rpm, 158 hp
       Start mode   Manual
       Stop mode    Manual
       Interval     Off
       Sample clk   Internal

                              Acquisition board settings
          Fast             Slow       Dual rates   Signal trigger  pre  post-trig
          1.000 k          1.000 k     No             No          ---   ---
          1.000 k          1.000 k     No             No          ---   ---

                                  10 MHz Amplifier
         Name  Span  Offset Coupling Filter     Technical      Technical   Unit
                [V]    [V]                      scalar          offset
        1 Amp  4.000  0.000    DC    Full       1.000          0.000       Volt
        2 Amp  20.00  0.000    DC    Full       1.000          0.000       Volt
```

Shut Down

The ***Shut Down*** command opens a dialog that allows you to shut down your Odyssey or exit to Windows.

 This menu command has the same effect as the **Shut Down** tool command in the **Toolbar**.

As with any computer, you should always shut down your Odyssey before turning off power.



To shut down or exit to Windows:

1. Select from the two options. If you select **Shut down the Odyssey**, the Windows software closes and the Odyssey can be powered down. Wait until you see "It's now safe to turn off your Odyssey" before pushing the off switch on your Odyssey. If you select **Exit to Windows**, the Odyssey software closes, allowing you to continue to use Windows or any other PC software you may have installed.
2. Click **Yes** to either shut down your Odyssey or exit to Windows, depending on your selection, or **No** to return to the Odyssey software.

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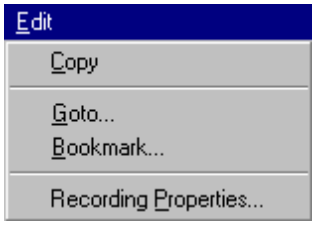
Chapter 7:
Using the Edit Menu



Edit Menu

The ***Edit*** menu contains commands that allow you to copy information, go to a specific area of a recording, place a bookmark, or view the properties of the current recording.

Copy

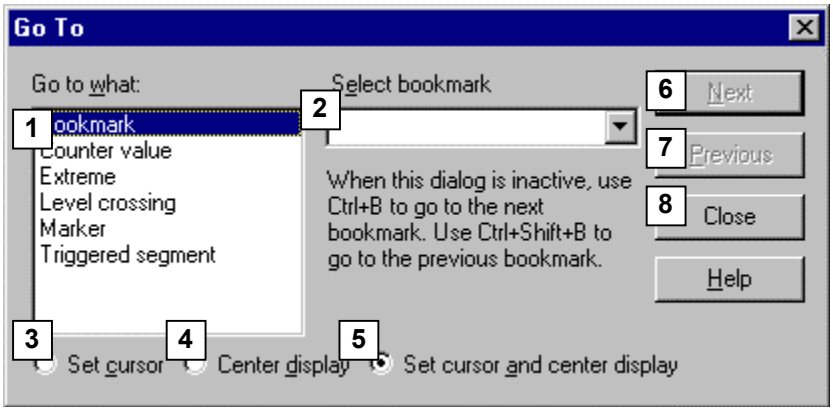
The ***Copy*** command copies a picture of the active display to the clipboard in two formats: as a Windows bitmap (color) for placement in another document and a Windows metafile, which resembles a printout on paper using the **Plot** button.

Goto

The ***Goto*** command opens a dialog that allows you to move the current cursor and/or the display to a specific area of the recording, based on either a counter value or marker.

 This menu command has the same effect as the **Goto** tool command in the **Toolbar**.

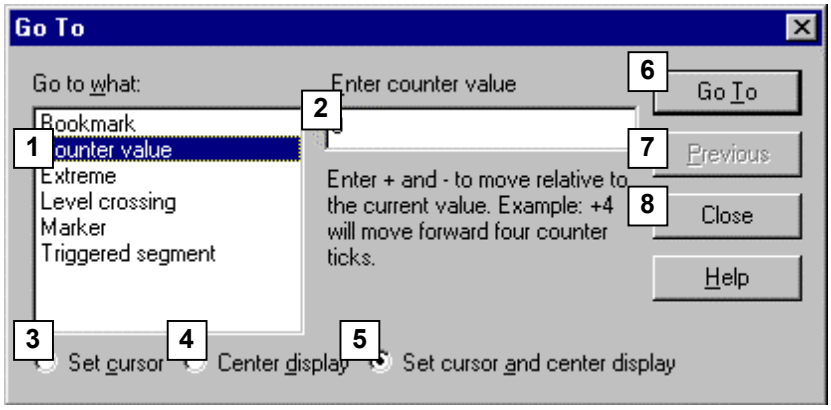
Bookmark



A bookmark is any location in a recording you define in the ***Edit…Bookmark*** dialog. (A description of setting bookmarks is in the next section of this Chapter.) You can then quickly return to the location of interest using the Go To Bookmark function. To search for a bookmark:

1. In the **Go to what** area, select **Bookmark** (**1**).
2. Select a bookmark from the drop down menu (**2**).
3. Click on **Set cursor** (**3**) to move only the cursor, click on **Center display** (**4**) to move the display to center the area of interest only, or click on **Set cursor and center display** (**5**) to move the display to center the area of interest and move the cursor to that point.
4. Click **Next** (**6**) to go to the next bookmark or, once you have entered more than one bookmark, click **Previous** (**7**) to go to the previously entered bookmark.
5. When you are done searching the recording, click **Close** (**8**) to close the dialog.
6. The keyboard shortcuts Control-B for next bookmark and Shift-Control-B for previous bookmark may be use at any time, with or without the dialog box.

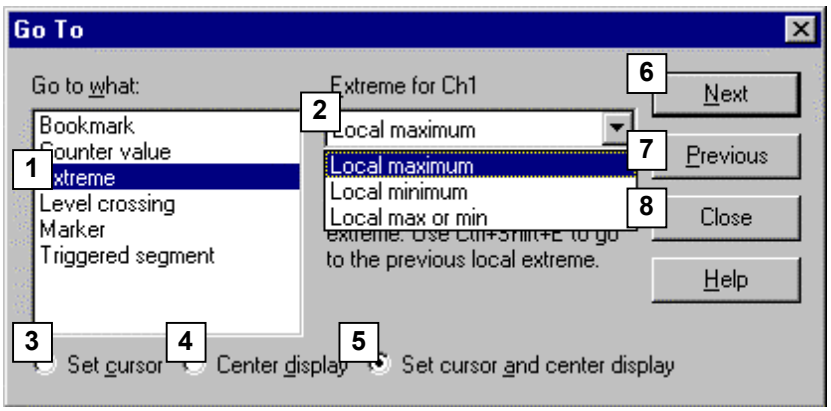
Counter Value



To go to a specific area of the recording by entering a counter value:

1. In the **Go to what** area, select **Counter Value** (**1**).
2. Enter either a plus sign (+) to move forward from the current value or minus (-) to move backward from the current value and then enter the number of seconds to move (**2**). Alternatively, enter a number of seconds to move directly to that time within the recording.
3. Click on **Set cursor** (**3**) to move only the cursor, click on **Center display** (**4**) to move the display to center the area of interest only, or click on **Set cursor and center display** (**5**) to move the display to center the area of interest and move the cursor to that point.
4. Click **Go To** (**6**) to go to the current counter value.
5. When you are done searching the recording, click **Close** (**8**) to exit the dialog.

Extreme



To go to a local maximum, local minimum, or next local extreme either max or min:

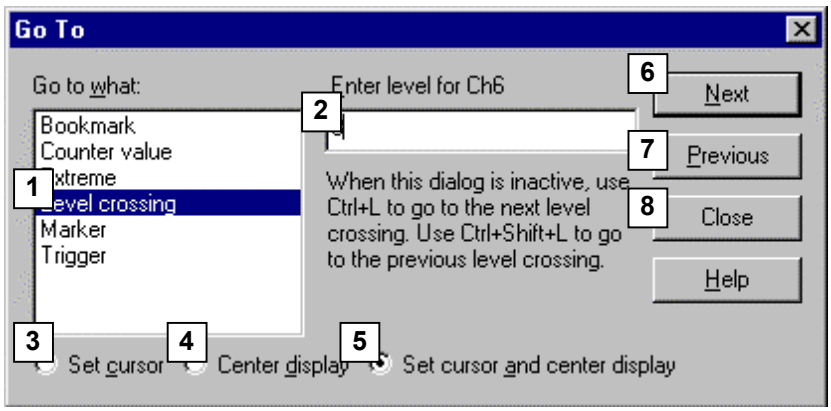
6. In the **Go to what** area, select **Extreme** (**1**).
7. Select the extreme for the selected channel from the drop-down menu (**2**).
8. Click on **Set cursor** (**3**) to move only the cursor, click on **Center display** (**4**) to move the display to center the area of interest only, or click on **Set cursor and center display** (**5**) to move the display to center the area of interest and move the cursor to that point.
9. Click **Next** (**6**) to go to the next extreme or, click **Previous** (**7**) to go to the previous extreme.
10. When you are done searching the recording, click **Close** (**8**) to exit the dialog.

The keyboard shortcuts Control-E for Next Extreme and Control-Shift-E for Previous Extreme may be used at any time, with or without the dialog box.

The Odyssey front panel also uses the Cursor buttons (near the Scroll knob) to search for extremes:

Press:	**to Go To:**
Up + Right	Next Local Max
Up + Left	Previous Local Max
Down + Right	Next Local Min
Down + Left	Previous Local Min
Up:	Exchange Cursors
Down:	Exchange Cursors

Level Crossing



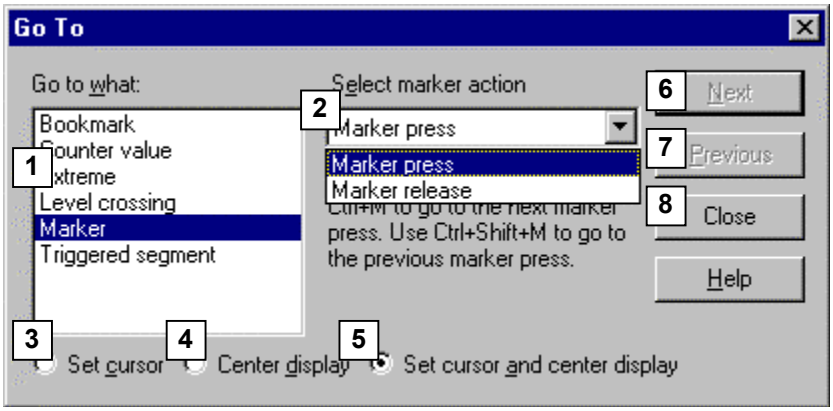
To go to a level crossing:

1. In the **Go to what** area, select **Level Crossing** (**1**).
2. Enter the threshold value for which to search for the selected channel (**2**). If you have entered Technical Units scaling, the value corresponds to those units. For example, if your full scale is ±500 g, enter 250 to search for a positive half-scale value.

   If no value is entered, zero crossings are located.
3. Click on **Set cursor** (**3**) to move only the cursor, click on **Center display** (**4**) to move the display to center the area of interest only, or click on **Set cursor and center display** (**5**) to move the display to center the area of interest and move the cursor to that point.
4. Click **Next** (**6**) to go to the next requested level crossing or, click **Previous** (**7**) to go to the previous level crossing.
5. When you are done searching the recording, click **Close** (**8**) to exit the dialog.

The keyboard shortcuts Control-L for Next Level Crossing and Control-Shift-L for Previous Level Crossing may be used at any time, with or without the dialog box.

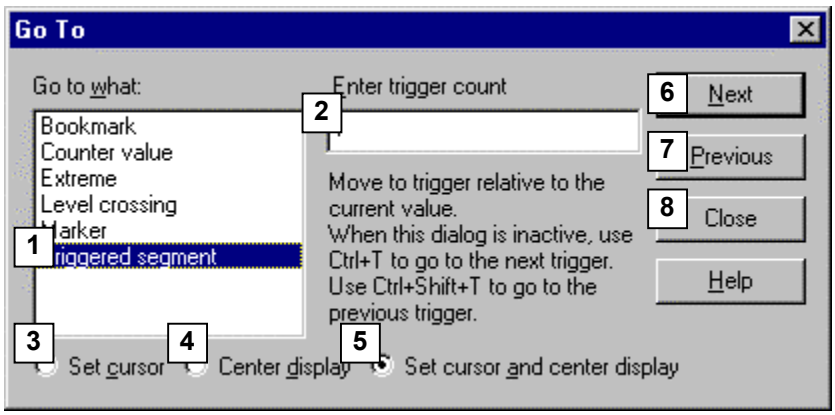
Marker



To search for marker events you defined while recording by pressing the ⎍ (marker) button on the front panel:

1. In the **Go to what** area, select **Marker** (**1**).
2. Select either **Marker press** or **Marker release** from the drop down menu (**2**).
3. Click on **Set cursor** (**3**) to move only the cursor, click on **Center display** (**4**) to move the display to center the area of interest only, or click on **Set cursor and center display** (**5**) to move the display to center the area of interest and move the cursor to that point.
4. Click **Next** (**6**) to go to the next marker action selected or, once you have entered more than one value, click **Previous** (**7**) to go to the previously entered marker action.
5. When you are done searching the recording, click **Close** (**8**) to close the dialog.

Triggered Segment



To go to search for trigger events:

1. In the **Go to what** area, select **Triggered Segment** (**1**).
2. Enter the number of the Trigger to search (**2**). The default value of 1 will go to the next trigger found. A value of 4 will skip the next three triggers and go to the fourth.
3. Click on **Set cursor** (**3**) to move only the cursor, click on **Center display** (**4**) to move the display to center the area of interest only, or click on **Set cursor and center display** (**5**) to move the display to center the area of interest and move the cursor to that point.
4. Click **Next** (**6**) to go to the next trigger event (or count of trigger events), or click **Previous** (**7**) to go to the previous trigger event.
5. When you are done searching the recording, click **Close** (**8**) to close the dialog.
6. The keyboard shortcuts Control-T for next trigger and Shift-Control-T for previous trigger can be used at any time with or without the dialog box.

Note: *A Triggered Segment may include more than one trigger event. If additional valid triggers occur during the specified Post-trigger interval, the Triggered Segment is extended to include all re-triggers and their post-trigger time as well. This guarantees that no triggers will ever be missed even if they are only microseconds apart. For search purposes, the GoTo function locates only the first Trigger in the Triggered Segment.*

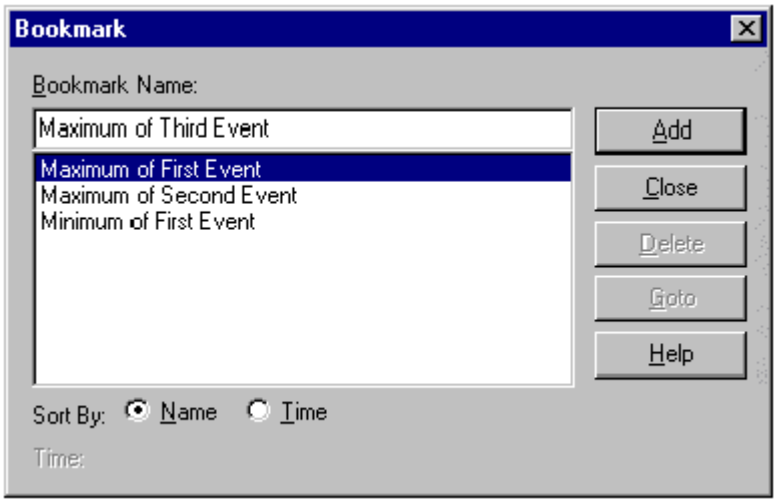
It is possible to search for each re-trigger, if required, by displaying the digital Event trace named Trigger, and searching for its level crossings.

Bookmark

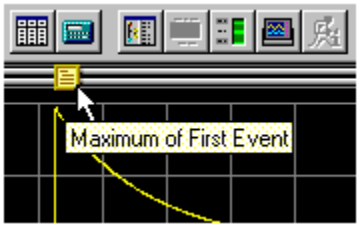
The ***Bookmark*** command enters a "bookmark" in a recording while you are reviewing. It is similar in function to the front panel ⎍ (marker) button, but allows you to define points of interest after the recording is made. You cannot place bookmarks in a live recording. Use the ***Goto*** command to find bookmarks you placed in the recording.

To set a bookmark:

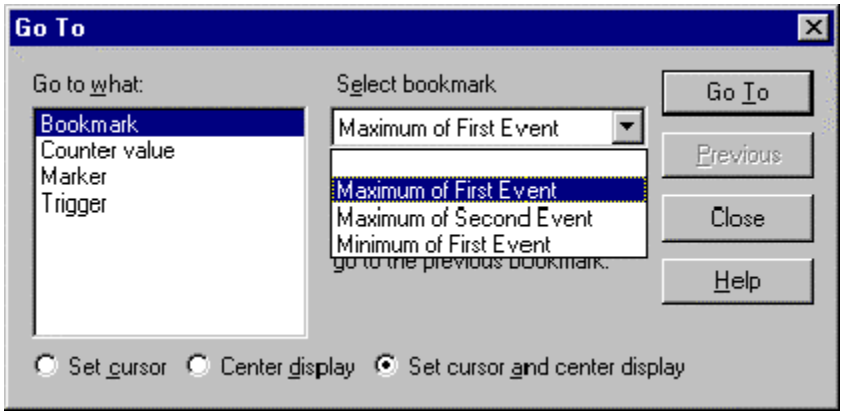
1. Place the cursor at the point of interest, then open the **Edit…Bookmark** dialog and type a name for your Bookmark.
2. Click the **Add** button to add the Bookmark name to the list.



In the waveform display, the Bookmark is indicated by a small page symbol in the Marker/Cursor bar. If you point the mouse at this marker, the name of the Bookmark appears.

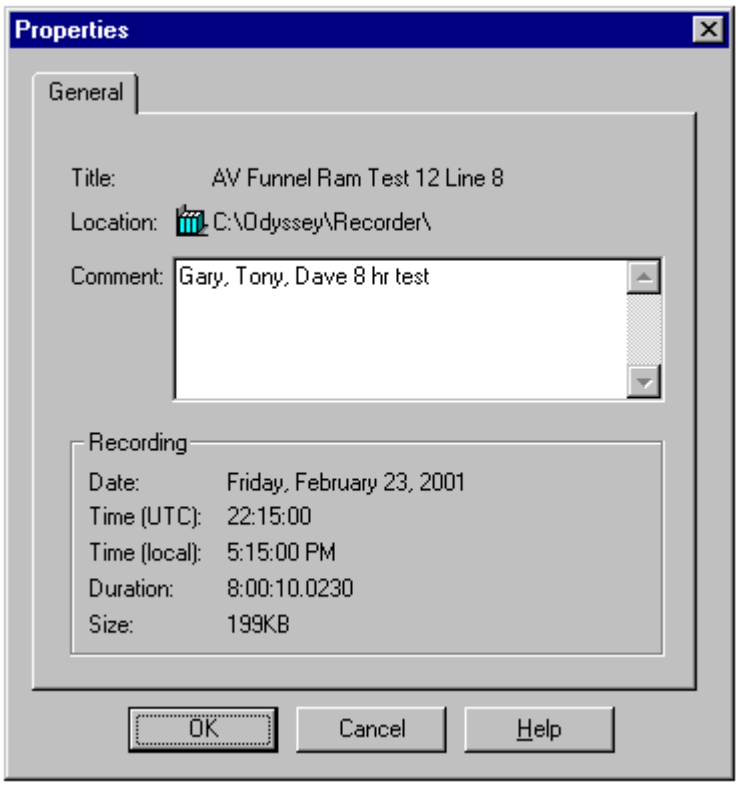


You can search for Bookmarks you have defined by using the **Go To** feature.



Recording Properties

The ***Recording Properties*** command opens a dialog that provides information about the current recording and allows you to enter or edit comments about the recording.



The dialog displays the following information:

Title - the title of the current recording, if you entered one.

Location - the location where the recording was saved.

Date - the date the recording was started.

Time - the time the recording was started in both local and UTC time.

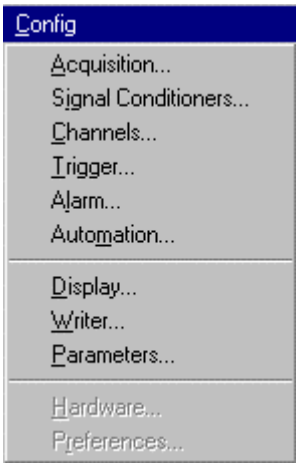
Duration - the length of the recording in hours: minutes: seconds.

Size - the approximate size in bytes of the recording.

You can enter comments about the recording by clicking in the **Comment** area and entering your comments.

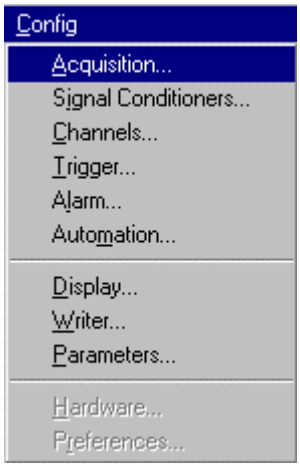
Click **OK** to exit the dialog and save any comments entered, or **Cancel** to exit the dialog without saving the comments.

Chapter 8:
Using the Config Menu



Config Menu

The ***Config*** menu contains commands that allow you to enter settings for your test, configure the display, and configure the DSP-calculated parameters.



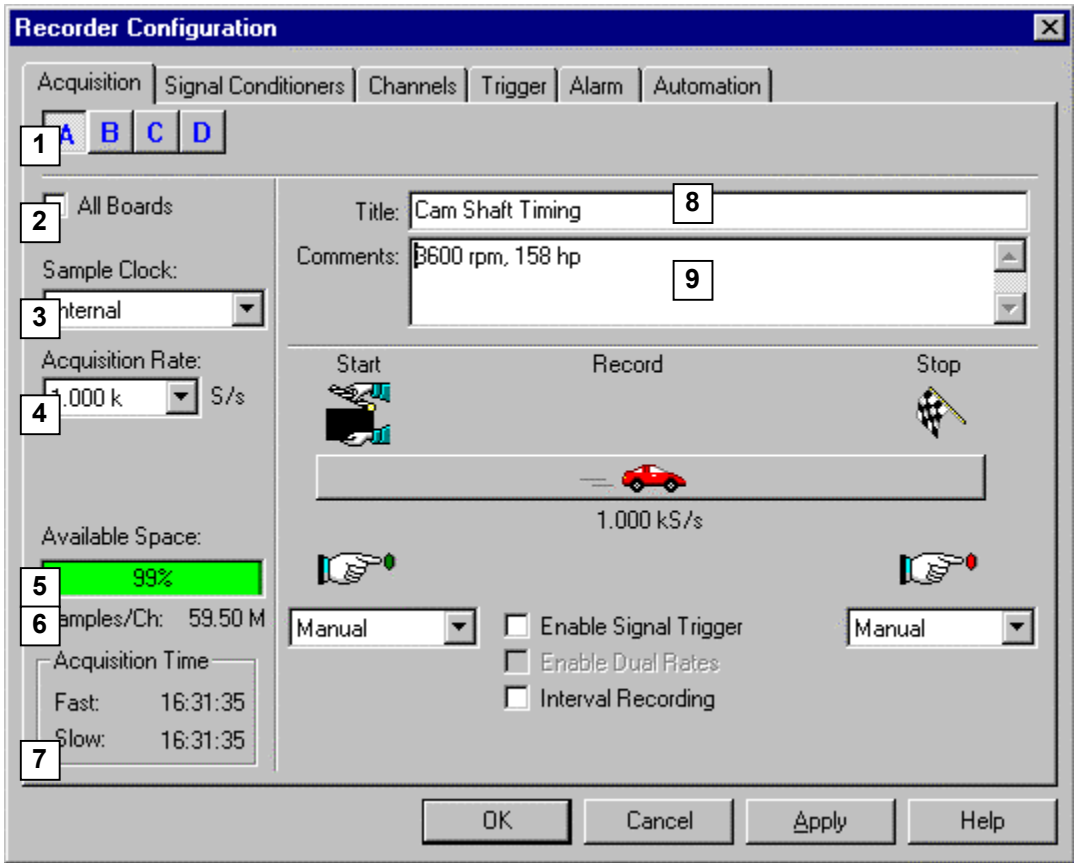
Acquisition

The ***Acquisition*** command opens the **Acquisition** tab of the **Recorder Configuration** dialog, which allows you to enter the sample rate, title, comments, and acquisition mode.

The **Recorder Configuration** dialog contains six tabs. You can view any of the others by clicking on the corresponding tab. The **Acquisition** tab allows you to enter the overall settings for data acquisition such as timebase and trigger modes. Your Odyssey contains from one to four acquisition boards, depending on the options you selected when you ordered your system. You can use this tab to make acquisition settings for each board separately, or for all the boards at once.

You can configure the system for single or dual rate triggers. You can enable/disable the system trigger events. If trigger events are enabled, you can additionally enable a dual rate to "accelerate" the data sampling rate when a trigger event occurs.

Single Rate Acquisition Without Trigger Events

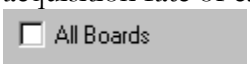


In this mode, the Odyssey starts recording when the **Start** button is pressed and continues recording until the stop button is pressed. To configure the system for single rate acquisition without trigger events:

1. Click on an acquisition card to configure (**1**). Board "A" refers to the first acquisition card, board "B" refers to the second, etc. All channels on a card acquire at the same rate.

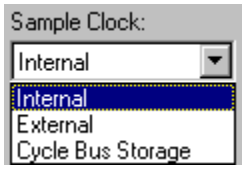
   

   By default all acquisition cards acquire at the same rate. You can choose to configure the acquisition rate of each card separately by un-checking the **All Boards** (**2**) control.

   If you choose **All Boards**, the following prompt appears, warning you that selecting this option overwrites any acquisition configurations that exist for the other cards. If you click **OK**, all the boards use the same acquisition rate. If you click **Cancel**, no changes are made to other board configurations.
   If your system contains a mix of different acquisition cards, only those selections common to all cards are displayed when **All Boards** is checked.

2. Select a sample clock from the drop down menu (**3**).

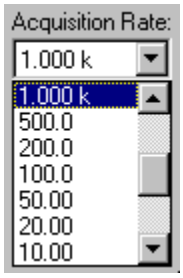


Select **Internal** to use the built-in internal clock.

Select **External** if your data is synchronized to an external clocking device such as a shaft encoder. Select **External** only if you connected an external clocking device to the **Clock In** BNC connector on the rear panel of your Odyssey. The maximum **External** clock rate is 50 kHz for the OD-100 and 1 MHz for the OD-200. If your system is equipped with more than one acquisition board, the external clock applies to the entire system and cannot be set independently for each board.

OD-100 Only: Select **Cycle Bus Storage** to store one sample each time a cyclic event is detected, a powerful data reduction tool. In this mode, a "Cycle Bus Master" is designated in the ***Configure Channels*** dialog, and one sample is recorded from every channel each time the Master detects a cycle. Like **External Clock**, this setting applies to the entire system. All channels store a sample with each **Cycle Bus** signal. Using this powerful mode, an automotive engineer can record the peak pressure of every combustion cycle, or an electrical engineer can store the RMS value of each cycle of the powerline.

3. Select an acquisition rate from the drop down menu (**4**). Use the scroll bar to find and select the desired rate.

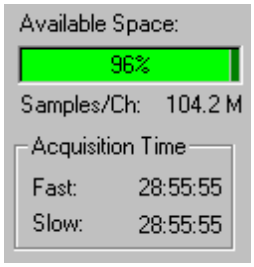


4. View the **Available Space** (**5**), **Samples/Ch** (**6**), and **Acquisition Time** (**7**) to confirm that you can store the necessary data, given the acquisition rate you selected. If you have multiple acquisition boards in your system with different rates or different disk sizes, all the amounts

shown report the minimum of all the boards.

The **Available Space** is shown as a green highlighted bar. The percentage shown is the amount of space still available for data storage.

5. **Samples/Ch** displays the number of samples per channel you can record at the current settings.
   Acquisition Time displays the recording time still remaining in hours, minutes, and seconds, given the acquisition rate you selected. These values change when you change the acquisition rate. If you are configuring a dual rate recording, the values for fast and slow change independently as you change those rates. If you are using an External Clock or Cycle Bus Storage, the acquisition time cannot be calculated because the clock rate is not known.



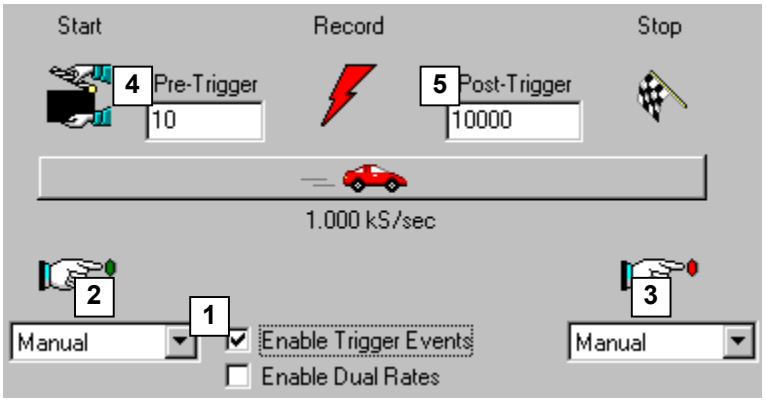
OD-200 Only: The OD-200 uses lossless data compression to automatically increase storage space. If, as often happens, your signals are at a fixed baseline much of the time, the actual Acquisition Time Available may be as much as 50-100% larger than indicated.

6. Enter a **Title** (**8**) for the recording and any **Comments** (**9**) you want to save with the recording. Titles may contain up to 250 characters, including spaces and punctuation marks. Comments may contain several thousand characters. The reserved Windows characters **:\/<>*.|?”** may not be used in titles, but may be used in comments.

7. If you are not using triggers or dual rate, proceed to *Starting and Stopping a Recording,* page 8-10.

Single Rate Acquisition Using Trigger Events

You can configure your system to detect events of interest during the recording using specified triggers. When you click **Enable Trigger Events**, additional options appear allowing you to configure the triggers. The capabilities vary slightly between the OD-100 and OD-200 acquisition cards. These differences are noted in the text.



In the case of single rate acquisition, triggers are used to place markers in the data stream only and do not change the acquisition rate or recording state. Data is recorded continuously when you press Start. Triggers do not start the recording, but are used for several purposes:

1. A trigger creates an indexed link in the recording, so all triggers can be instantly searched and viewed using the **Go To** features (see Chapter 7).

2. At acquisition rates less than maximum, a **Triggered Review** feature creates a split screen where each trigger is frozen and displayed on the left while scrolling data continues recording on the right (see Chapter 10). Triggered Review data can be zoomed, printed, and exported *even while recording continues*. This feature is available at acquisition rates less than 10 kS/s on the OD-100 and less than 100 kS/s on the OD-200.

3. A triggered segment, including pre-trigger and post-trigger data, can be automatically saved, exported, plotted or sent to post-processing software. At acquisition rates less than maximum, triggered segments can be captured, viewed, and analyzed *while recording continues*, allowing you to view unusual events in detail without interrupting the recording (see the *Config…Automation* section in Chapter 8.)

4. The Odyssey can be set to stop recording after a trigger or a number of triggers, with a choice of automatic actions upon stopping. Triggered data can be automatically saved, exported, or analyzed in Pro View, imPRESSion or Spectra Pro (see the *Config…Automation* section in Chapter 8.)

To configure the system for single rate acquisition using trigger events:

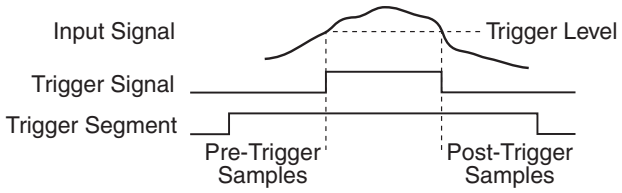
1. Click **Enable Trigger Events** (**1**) to show the trigger options.

2. Enter a **Pre-Trigger** (**4**) number of samples. The **Pre-Trigger** specifies how many samples are collected for each channel prior to a trigger event. The maximum number is approximately 24,000 for the OD-100, and slightly less than maximum transient memory for the OD-200.

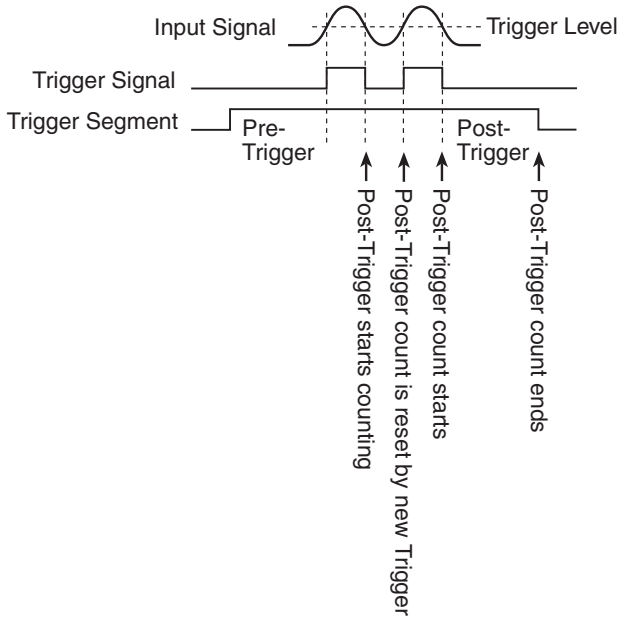
3. Enter a **Post-Trigger** (**4**) number of samples. Unlike conventional oscilloscopes or transient recorders, the Odyssey remains triggered for as long as the trigger condition is true. This assures you will always capture the entire length of the event of interest, without being limited to a fixed post-trigger size. The **Post-Trigger** specifies how many samples are collected after a trigger event goes false. **Post-Trigger** recording continues as long as the trigger remains true, then collects the additional **Post-Trigger** samples you specify.

   The maximum number of post-trigger samples is 64,000 for the OD-100. On the OD-200, the total of pre-trigger plus post-trigger may be the full transient memory size.

   The triggered segment includes all **Pre-Trigger** samples, all samples collected while the Trigger signal is true, and all **Post-Trigger** samples as shown below.



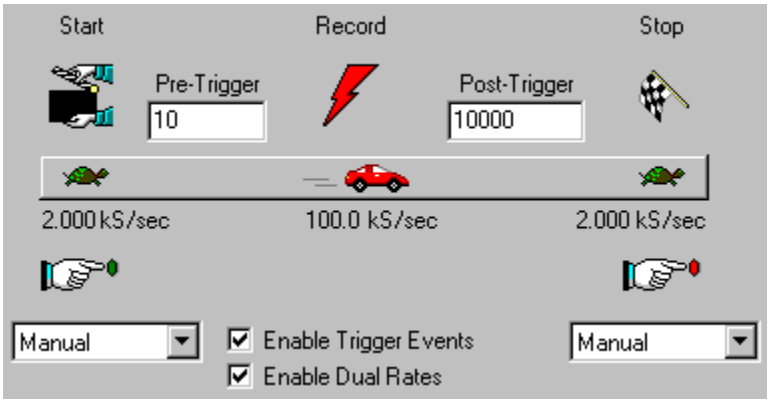
   If additional triggers occur before the **Post-Trigger** count has elapsed, the **Post-Trigger** counter is reset and additional samples are included in the triggered segment. Unlike most other instruments, no triggers are ever missed and there is no dead time between triggers.



Note: *While the Odyssey can accept tens of thousands of triggers, a very large number requires more processing time to display and copy. Therefore we recommend that excessive continuous triggers should be avoided when possible.*

Dual Rate Acquisition Using Trigger Events

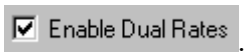
You can configure your system to acquire high-speed data around specified triggers while recording slowly the rest of the time to conserve storage space. This mode is similar to traditional transient recorder operation, but offers the additional advantage of viewing and recording a selected amount of baseline data between triggers. In this manner, very infrequent events like intermittent problems can be captured with great detail, even during a very long duration recording. When you click **Enable Trigger Events**, additional options appear allowing you to configure the triggers.



To configure the system for dual rate acquisition using trigger events, set up your triggers as you would for single rate acquisition and select **Enable Dual Rates**. Now, instead of simply entering a marker in the data stream at each trigger event, the acquisition rate changes and the data is recorded at an accelerated rate, including high-speed pre-trigger, for the period you specify in the **Pre-Trigger** and **Post-Trigger** boxes. When a trigger occurs, the Odyssey switches to the higher rate for as long as the trigger condition is true. When the trigger condition is no longer true, the system continues to record at the high rate for the number of **Post-Trigger** samples. After the **Post-Trigger** samples are collected, the system switches back to a low sample rate to conserve storage space. Because the slow sample rate can be up to 50,000 times slower, the storage between triggers can use only a negligible amount of space. Any number of triggers may occur during a recording each with high-speed pre-trigger and post-trigger data.

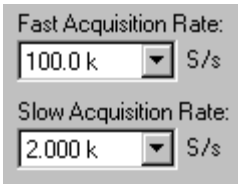
To enter dual acquisition rates:

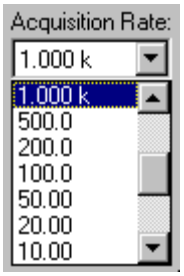
1. Click **Enable Dual Rates** (**1**) to show the dual acquisition rate options. (This option is not available if External or Cycle Detect Clock is selected.)

   .

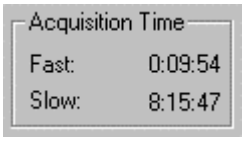
   Enter a Fast and Slow acquisition rate using the drop down menus. Use the scroll bar to find the desired rates. For the OD-100, rates from 100 kS/s to 0.1 S/s are available. For the OD-200, the fast rate can be as high as 10 MS/s and the slow rate may range from 200 kS/s to 0.1S/s or Off.





Note that if the data recorded between triggers is not of interest to you, the Odyssey's Post-Processing features allow you to save, print or export only the Triggered Segments.

Fast acquisition during triggered events consumes more storage space, so the available recording time is shorter. The Fast number represents the minimum recording time if many closely-spaced triggers occur. The Slow number represents the maximum recording time if few or no triggers occur.



Note: While the Odyssey can accept tens of thousands of triggers, a very large number requires more processing time to display and copy. Therefore we recommend that excessive continuous triggers should be avoided when possible.

2. When you are finished entering acquisition configurations, click **OK** at the bottom of the dialog to enter the configuration and exit the dialog, click **Cancel** to exit the dialog without making changes to the system configuration, click **Apply** to apply the changed configurations to the current recording, or click **Help** to receive help with the dialog. You can also click on another tab to set other configuration parameters.

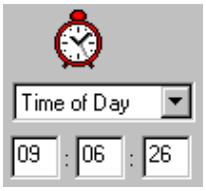
Starting and Stopping a Recording

Several methods are available for manually or automatically making a recording. To make a single recording, follow these two steps.

1. Select how the recording should begin (**2**).

   The methods for starting a recording are:

Manual - starts recording when you push the **Start** button, click on the **Start Recording** button in the **Control Palette**, or select **Start Recording** from the ***Control*** menu.



Time of Day - starts recording at the specified time of day in hours: minutes: seconds (twenty-four-hour system). Note that the **Time of Day** will start one recording only. To make a new recording each day, additionally set **Interval Recording** to an interval of 24 hours.

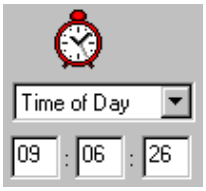
External - starts recording when the system receives an external start signal from a TTL input on the rear panel. To use this method, connect a switch or other normally open device between the External Start input (remote connector pin 36) and ground (pins 41-42) for at least 200 milliseconds. There will be a brief delay of a second or two before recording begins.

Technical Note: Unlike an oscillograph or transient recorder, the Odyssey does not start recording on a trigger. A Recording must be started before triggers can be accepted. However, the Odyssey's powerful dual-rate triggering mode can closely approximate a traditional triggered mode. Any number of triggered events can be captured with high-speed pre- and post-trigger. See *"Dual Rate Acquisition Using Trigger Events"* on page 8-8 for instructions.

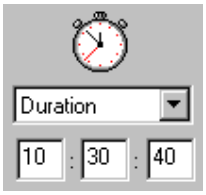
2. Select a type of ending event (**2**).

   The methods for ending a recording are:

Manual - stops recording when you push the **Stop** button on the front panel, click on the **Stop Recording** button in the **Control Palette**, or select **Stop Recording** from the ***Control*** menu.



Time of Day - stops recording at the specified time of day in hours: minutes: seconds (twenty-four-hour system).



Duration - stops recording at the specified amount of time after the start, in hours: minutes: seconds. The minimum duration is approximately 5 seconds. The maximum is 99 hours.

External - stops recording when the system receives an external stop signal from the TTL digital input on the rear panel. To use this method, connect a switch or other normally open device between the Stop input (remote connector pin 35) and Ground (pins 41-42) for at least 200 milliseconds.

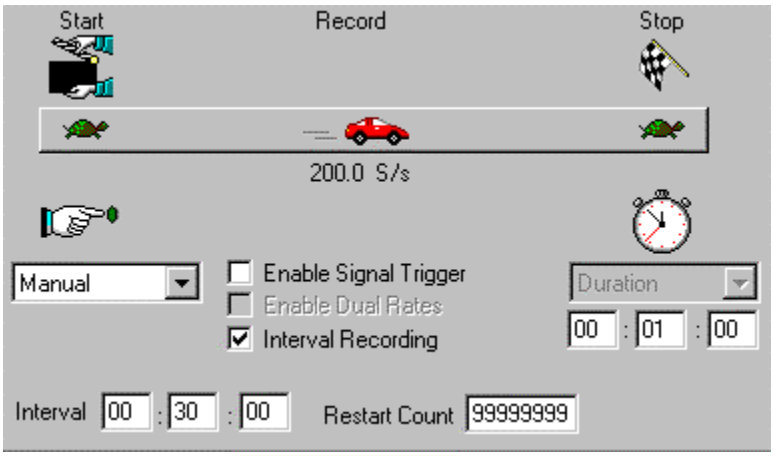
After Trigger(s) - stops recording after a specified number of triggers is received. If additional triggers are received while post-trigger data is still being collected, the triggered segment is extended to include the re-triggers. To avoid spurious operation due to noisy trigger signals, such closely spaced re-triggers are not included in the **After Trigger(s)** count.

Technical Note: To assure that all data of interest is recorded, the Odyssey stops only after the last trigger condition goes false. If the trigger remains true indefinitely, the Odyssey will not stop.

Interval Recording

There are often applications that require a number of consecutive samplings. One example is a survey of power utility load conditions, where a one-minute sample each hour is taken to be representative of overall conditions. The Odyssey includes an **Interval Recording** feature to meet these needs.

When you click **Interval Recording**, additional options appear allowing you to configure the interval.

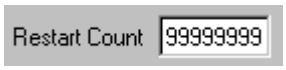


1. Select the Start method. Manual, Time of Day, and External start are available as described earlier in this section.

2. Enter an **Interval** at which recordings should be made in hours:minutes:seconds. This determines how often a new recording is started. The interval may be up to 99 hours. The minimum interval is approximately 5 seconds. If you enter zero, the Odyssey will make consecutive Recordings as quickly as it can. The example below shows an interval of 30 minutes.
   Note: Due to the multi-tasking of Windows, there is unavoidably a small uncertainty in the precise timing. The actual interval may vary approximately ±1 second from the value you enter.

3. Enter the **Duration**, which is the desired length of each recording in hours:minutes:seconds. The duration may be up to 99 hours. The minimum duration is approximately 5 seconds. The example below shows a duration of 1 minute. To maintain accurate timing, the Duration must be less than the desired Interval: for example, a one-minute Interval requires a Duration of less than one minute.

4. Enter the **Restart Count**, which is the total number of recordings to be made. The default value of 99999999 allows recording to continue indefinitely until you press the Stop button. The Recorder can hold a maximum of 511 recordings.



5. Recording begins when you press the Start button. To start Interval Recording at a given time, select the start condition Time of Day. The example shown here will automatically make a new one-minute recording every 30 minutes, beginning when you press Start.

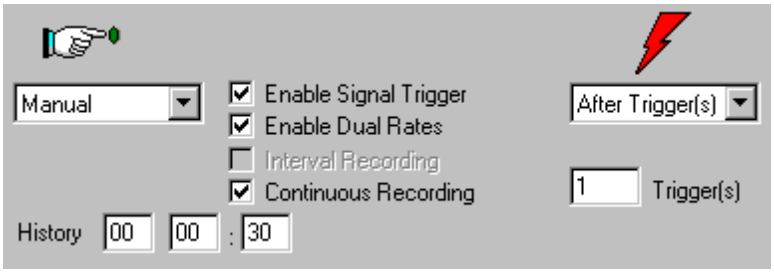
6. When you have made the required settings, click OK at the bottom of the dialog.

During Interval Recording, a timer is displayed on screen, showing the time remaining in this recording. While a recording is in progress, it counts down to display the remaining duration.

Interval Recording can be manually started and stopped at any time. Each recording is given the name you entered, with consecutive numbers appended. The Recorder can hold a maximum of 511 recordings in total.

Continuous Recording (OD-200 Only)

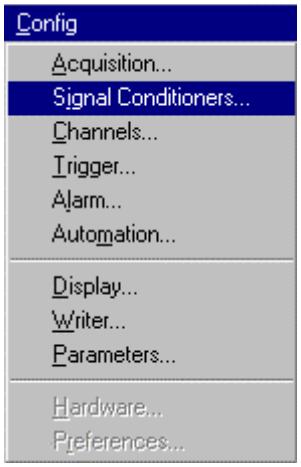
If your Odyssey system contains only OD-200 acquisition boards, an additional feature is available to provide Continuous Recording. In some long-term monitoring applications, it is desirable to record continuously for an extended period, while retaining only the most recent time history. In this case, the OD-200 can use any portion of its disk storage as a circular buffer, constantly overwriting the oldest information. If your system is capable of Continuous Recording, the additional control appears in the **Acquisition** dialog as shown below. (If the control is not shown, your system does not include this feature.)



When you click the **Continuous Recording** control, an entry for the amount of time History appears in Days:Hours:Minutes format. The example shows 30 minutes, meaning the Odyssey will always keep the most recent 30 minutes of recorded data. Older data is overwritten and discarded.

Continuous Recording places no restriction on Starting, Triggering or Stopping. You may use all of the OD-200 trigger capabilities including Triggered Segments, Dual Acquisition Rates, Dropout, etc. and the Recording may contain any number of triggers. However, it is often useful to stop automatically after a trigger (or a number of triggers), then examine the time history leading up to the events. A common example is a mechanical fatigue test that may last for days or weeks, stopping only upon failure. The dialog above shows the use of the Stop-After-Trigger in addition to Continuous Recording to accomplish this.

When you are finished entering all the Acquisition settings, click **OK** at the bottom of the dialog to accept the changes, click **Cancel** to return to the previous settings, or click another tab to set other Configuration parameters.



Signal Conditioners

The ***Signal Conditioners*** command opens the **Signal Conditioners** tab of the **Recorder Configuration** dialog, which allows you to configure the signal conditioners for each input.

Several types of signal conditioners may be installed in your Odyssey. Refer to the following pages for detailed instructions.

Basic Amplifier - page 8-16

Two-Point Calibration – page 8-20

Bridge Amplifier - page 8-24

Differential Amplifier Mode - page 8-35

High Voltage Isolated Amplifier - page 8-37

Low Voltage Isolated Amplifier - page 8-37

Accelerometer - page 8-38

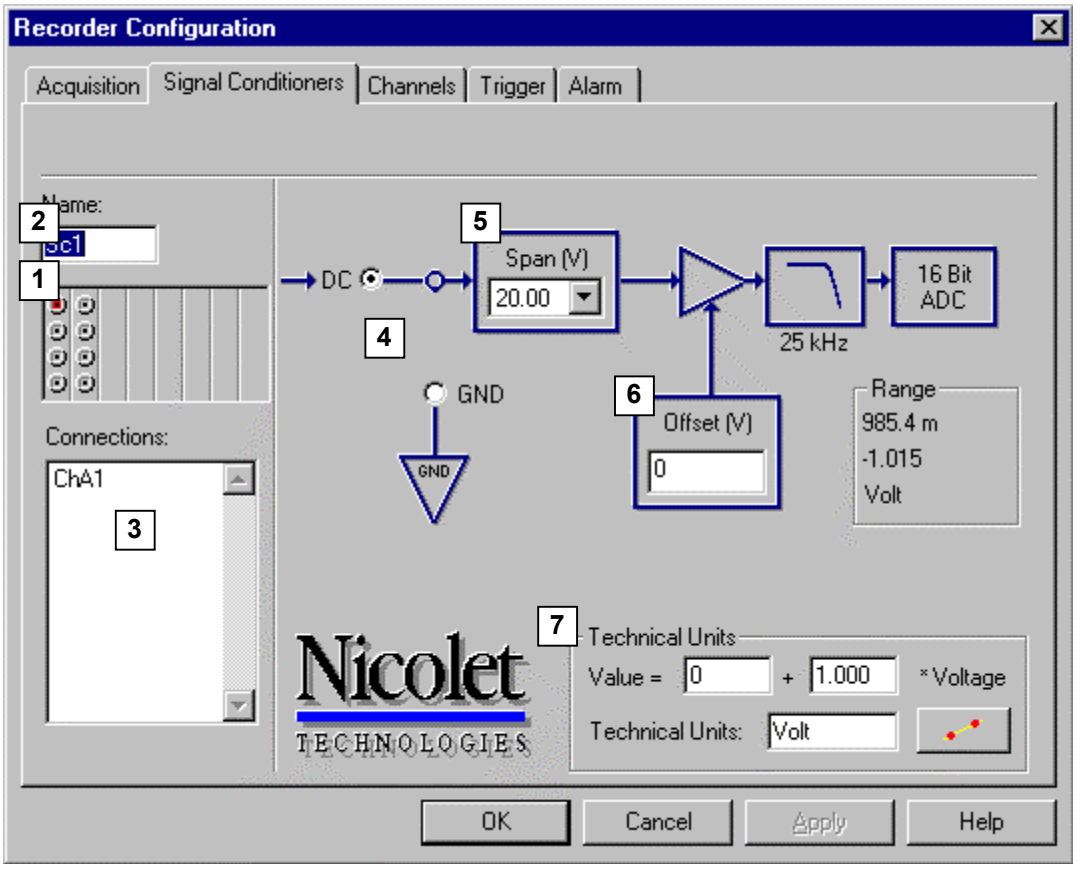
Thermocouple - page 8-40

OD-200 High Speed Amplifier – page 8-42

Counter-Timer - page 8-43

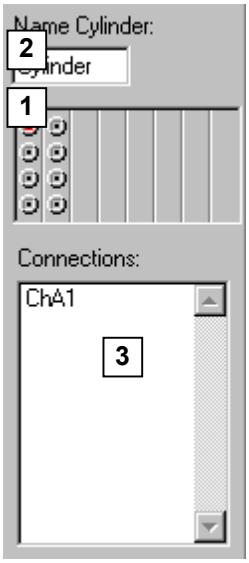
Basic Amplifier

The **Recorder Configuration** dialog below appears for each channel equipped with a basic amplifier.

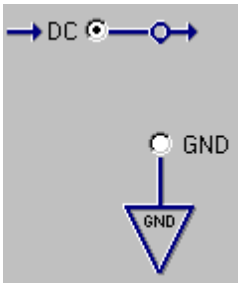


To configure a basic amplifier for an input:

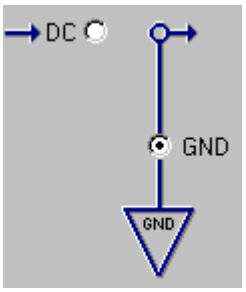
1. Select an input to configure (**1**) from the graphic representation of the back panel of your Odyssey, which shows the signal conditioners currently installed. Clicking on any one of the inputs selects it and presents its settings dialog. Enter a name (optional) (**2**). If you do not enter a name for the input, the default name of the input corresponds to the input names on the back panel of the Odyssey. The area (**3**) displays the acquisition channels connected to the selected signal conditioner. These settings are selected in the **Channels** tab of the **Recorder Configuration** dialog.



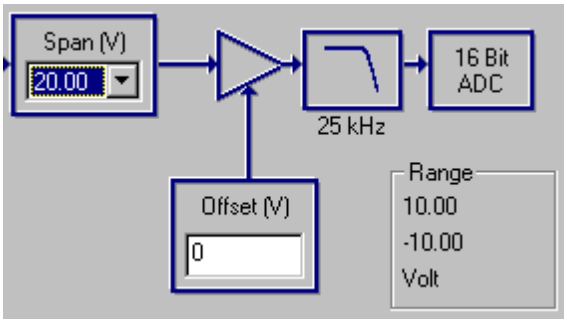
2. Choose a path for the signal (**4**). If you click **DC**, the signal is routed into the amplifier's input, if you click **GND**, the input of the amplifier is connected to earth ground. Use this feature to check for amplifier DC offsets and baseline noise.



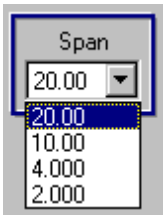
or



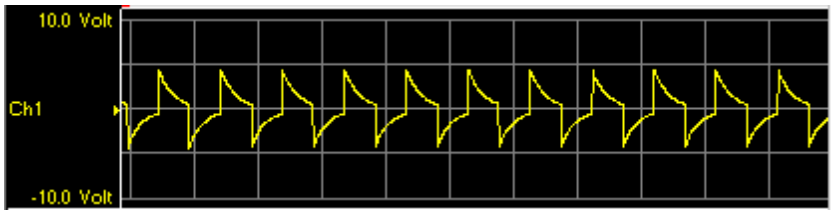
3. The signal conditioner configurations are contained in the area shown below. You can set the Span and the Offset. Each amplifier includes a 16 bit A to D converter and a fixed 25 kHz filter to eliminate high frequency noise which can cause aliasing.

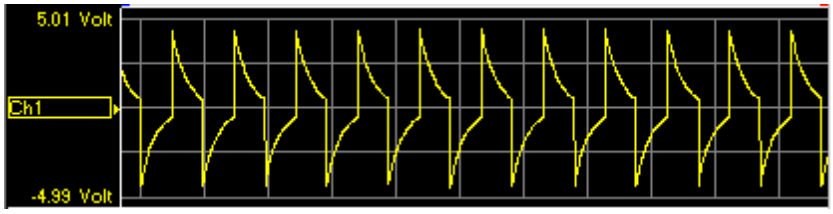


4. Set the **Span** (**5**) using the drop down menu. The span represents the full scale range in volts. For example, if a 20 V span is selected with no offset, the measurement range is from approximately -10V to +10V, as indicated by the adjacent display of total Range.



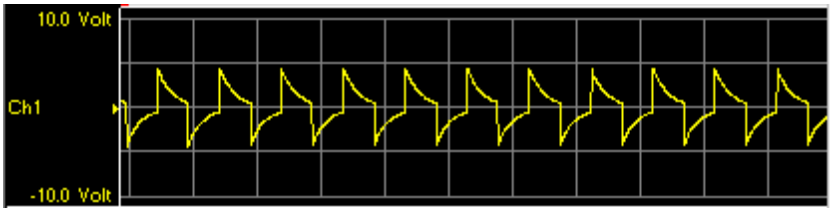
The following example shows the change in the **Recorder Display** when the span is changed from 20 V (top) to 10 V (bottom). While in the **Record** or **Pause** mode, the span can also be changed using the **Span** bar on the front panel.

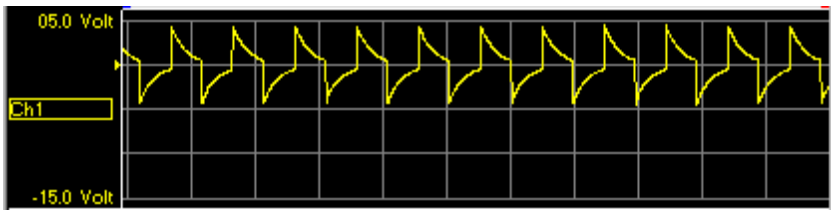




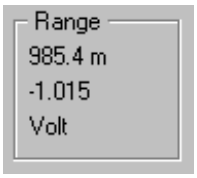
5. Enter an **Offset** (**6**) value in volts. While in **Record** or **Pause** mode, the offset can also be adjusted by turning the **Offset** knob on the front panel.

6. The following example shows the change in the **Recorder Display** when the offset is changed from 0 V (top) to +5 V (bottom). Enter a positive value for the offset to move the trace up and a negative value to move the trace down. Notice that the baseline pointer and the voltage numerics at the left edge automatically track your offset adjustments.

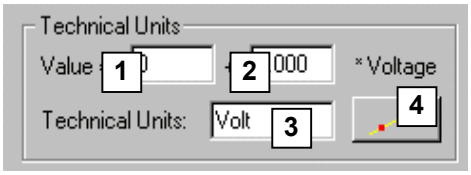




7. The **Range** area shows the range in volts or in Technical Units for the selections you have made.



8. You can customize the **Technical Units** that appear in the **Recorder Display** by entering the necessary values. Using this feature you can calibrate the units to correspond to your transducer. The left box (**1**) is an offset value, which is normally zero. Enter a value here only if zero volts does not represent a zero value in engineering units (a 4-20 mA current loop, for example). The right box (**2**) is the multiplier or scale factor of your transducer expressed as units per volt. If a pressure transducer produces 1V output for 1000 psi pressure, enter 1000 or 1k in this box. Enter the desired units in the Technical Units field (**3**). The system automatically adds standard prefixes as required for micro-, milli-, kilo-, mega-, etc.

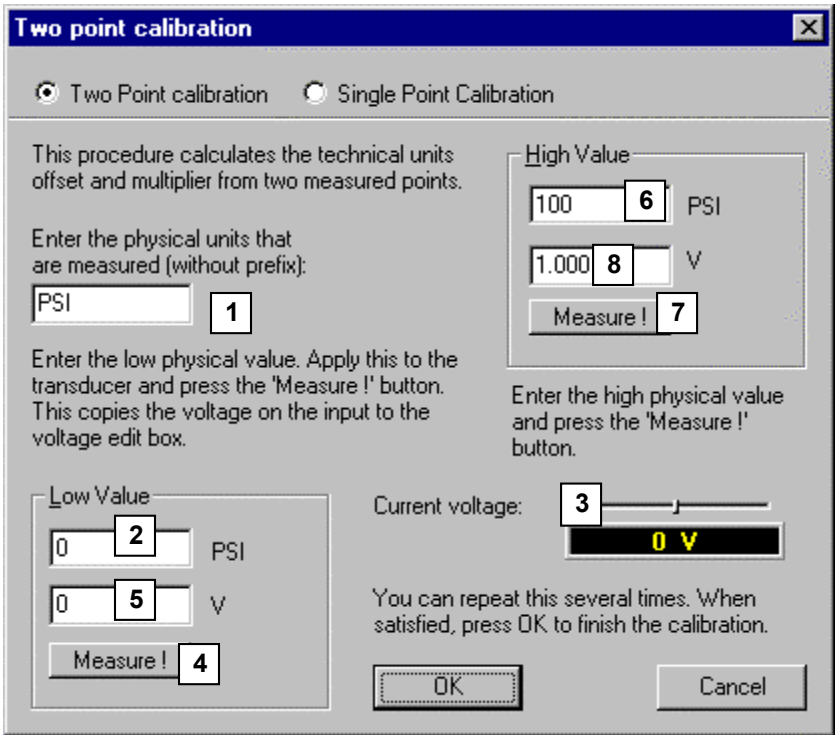


Nicolet recommends the use of only positive values for a multiplier. If your sensor input is inversely proportional to the desired quantity, use of the real-time Math Invert function is preferred.

Two-Point and Single-Point Calibration

You can automatically set your amplifier's Technical Units scaling by applying known inputs or entering calibration points. You may either apply physical inputs or enter data sheet values, and the Odyssey will calculate the appropriate offset and multiplier. Click on the Two-Point Calibration button  at the bottom right of the Technical Units area.

When you click on this icon, a new dialog appears.



There are four ways of using the Calibration dialog. Use Physical Calibration if you are applying an input to the Odyssey. Use Data Sheet Calibration if you are entering transducer specification values.

Single-Point Physical Calibration

Use this method if you wish to apply one physical input level representing a high value. Follow this procedure to automatically calculate the Technical Units scaling.

1. Select **Single Point Calibration** at the top of the dialog.
2. In the **Units** box (**1**), enter the physical units measured by your transducer such as PSI.
3. In the **High Value** box (**6**), enter the value of the input signal such as 100 PSI.
4. Apply the calibration value of pressure, force, etc. to your transducer.

5. The **Current Voltage** meter (**3**) displays the input signal value in real time, to assure the input follows expectation and to show when a stable value is achieved. A value between approximately 20% and 95% of full deflection is recommended for the most accurate calibration. If necessary, return to the **Signal Conditioner** dialog and adjust the amplifier **Span**.
6. When the input value has stabilized, click the **High Value Measure!** button (**7**) to capture the input voltage corresponding to the input. The value is inserted in the Voltage box (**8**).
7. After the input has been measured satisfactorily, click the **OK** button to accept the value and automatically compute the scaling. The baseline value is assumed to be zero volts for zero input. The calculated values will be inserted in the **Technical Units** dialog.

Two-Point Physical Calibration

Use this method if you wish to apply two physical input levels representing a high and a low value. Follow this procedure to automatically calculate the Technical Units scaling.

1. In the **Units** box (**1**), enter the physical units measured by your transducer such as PSI.
2. In the **Low Value** box (**2**), enter the physical value of the low input signal such as 0 PSI.
3. Apply the low value of pressure, force, etc. to your transducer.
4. The **Current Voltage** meter (**3**) displays the input signal value in real time, to assure the input follows expectation and to show when a stable value is achieved.
5. When the input value has stabilized, click the **Low Value Measure!** button (**4**) to capture the input voltage corresponding to the low input. The value is inserted in the **Voltage** box (**5**).
6. In the **High Value** box (**6**), enter the physical value of the high input signal such as 100 PSI.
7. Apply the high value of pressure, force, etc. to your transducer. A value between approximately 20% and 95% of full deflection is recommended for the most accurate calibration. If necessary, return to the **Signal Conditioner** dialog and adjust the amplifier **Span**.
8. When the input value has stabilized, click the **High Value Measure!** button (**7**) to capture the input voltage corresponding to the high input. The value is inserted in the Voltage box (**8**).
9. After both inputs have been measured satisfactorily, click the **OK** button to accept the values and automatically compute the scaling. Both a multiplier and an offset correction will be calculated. The calculated values will be inserted in the **Technical Units** dialog.

Single-Point Calibration From Data Sheet

Use this method if you have a transducer data sheet that shows a calibration point for voltage output at a given input, and the output is zero volts at zero input. You may enter this data directly and the amplifier will compute the Technical Units scaling for you.

1. Select a calibration point from the data sheet with the corresponding voltage output from the transducer. Select an amplifier Span that will include the highest voltage value.
2. Select **Single Point Calibration** at the top of the dialog. In the **Units** box (**1**), enter the physical units measured by your transducer such as PSI.
3. In the **High Value** box (**6**), enter the physical value of the calibration point such as 100 PSI.
4. In the **Voltage** box (**8**), enter the voltage that corresponds to the calibration point.
5. After both inputs have been entered, click the **OK** button to confirm the values and automatically compute the scaling. The baseline value is assumed to be zero volts for zero input. The calculated values will be inserted in the Technical Units dialog.

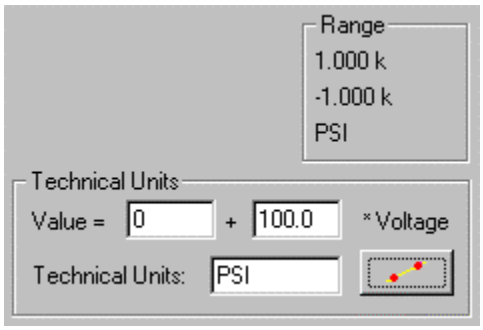
Two-Point Calibration From Data Sheet

Use this method if you have a transducer data sheet that indicates high and low calibration points. You may enter these data points directly and the amplifier will compute the Technical Units scaling for you.

1. Select a high and a low calibration point from the data sheet, with the corresponding voltage values. Select an amplifier Span that includes both voltage values.
2. In the **Units** box (**1**), enter the physical units measured by your transducer such as PSI.
3. In the **Low Value** box (**2**), enter the physical value of the lower data point such as 0 PSI.
4. In the **Voltage** box (**5**), enter the voltage that corresponds to the low data point.
5. In the **High Value** box (**6**), enter the physical value of the higher data point such as 100 PSI.
6. In the **Voltage** box (**8**), enter the voltage that corresponds to the high data point.
7. After both inputs have been entered, click the **OK** button to confirm the values and automatically compute the scaling. The calculated values will be inserted in the Technical Units dialog.

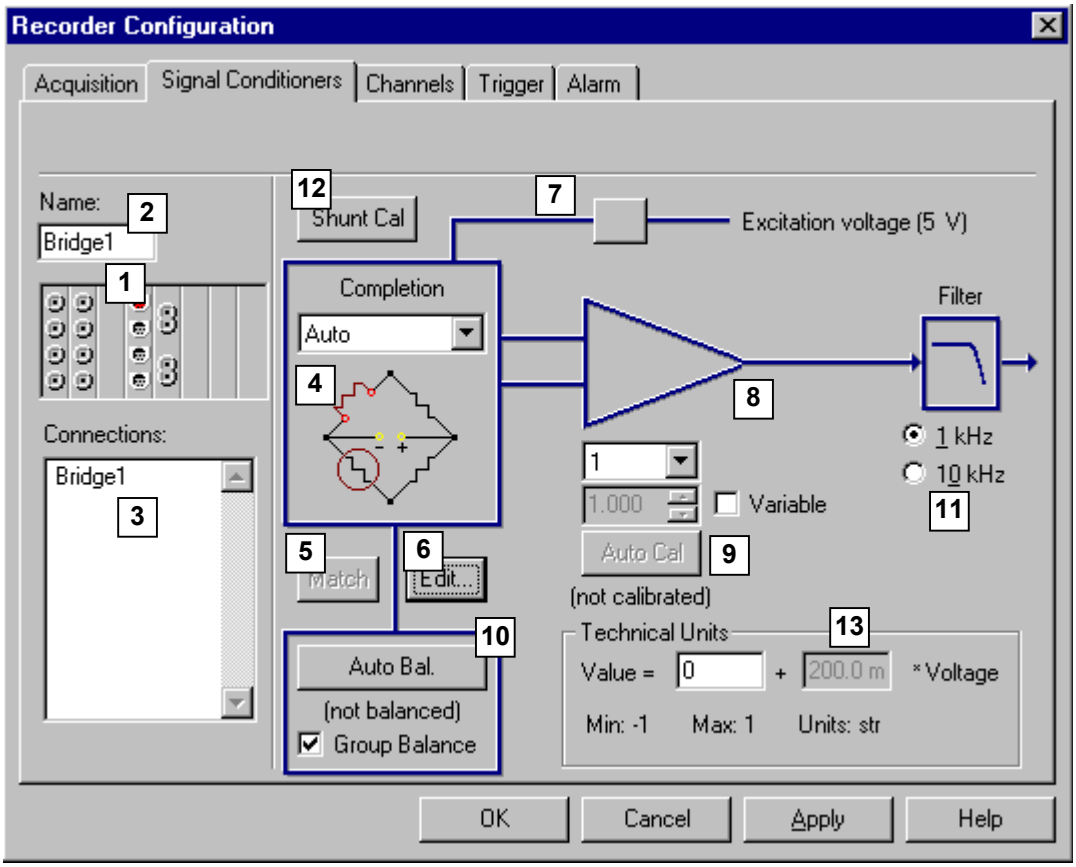
The amplifier uses your input to calculate and automatically enter the **Technical Units** scaling. The **Technical Units** box now reflects the new values and the Range box indicates the current span in physical units. You may use the **Span** and **Offset** controls to adjust the input range as needed: any changes you make will also update the Range display.

When you are done, click **OK** at the bottom of the amplifier dialog to apply the configuration and exit the dialog, click **Cancel** to exit the dialog without making changes, click **Apply** to apply the changed configurations to the next recording, or click **Help** to receive help with the dialog. You can also click on another tab to set other configuration options.



Bridge Amplifier

The Recorder Configuration dialog below appears for each channel equipped with a Bridge Amplifier.

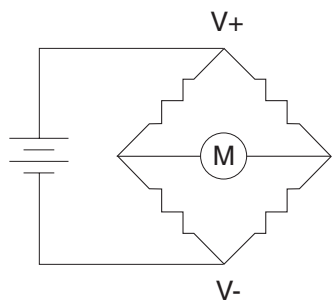


The Bridge Amplifier provides DC excitation voltage and flexible completion options for any type of Wheatstone bridge configuration. It is suitable for strain gages and strain-gage-based force and pressure transducers. It may also be used as a general purpose low voltage differential amplifier. This discussion assumes familiarity with strain gage terminology and usage.

An Introduction to Wheatstone Bridge Circuits

The classic DC Wheatstone Bridge circuit is a very sensitive indicator that is used with a variety of transducers for both static and dynamic measurements. The bridge is composed of four equal-value resistances as shown in the diagram below. A DC excitation voltage is applied to the top and bottom of the bridge, and an indicating instrument such as a meter or recorder is connected across the center terminals. When the bridge resistances are exactly equal, the bridge is termed "balanced" and the voltages on all four resistors are identical. The meter across the center terminals therefore indicates no voltage difference. If one or more of the resistances changes, even by a small amount, the bridge is unbalanced and a voltage is observed at the meter. If one or more of the resistors is a sensor which responds to physical inputs, then the meter indicates the amount of input.

Many types of transducers are designed as resistances that change slightly as a physical input is applied. A strain gage mounted on a metal beam is very slightly elongated as a force is applied to the beam, and its resistance increases linearly with increasing strain. If such a gage is connected in place of one of the bridge resistors, the meter reading also changes with the strain. With the proper gain and calibration, the meter can be scaled to read directly in strain or stress. When one of the four bridge legs is a sensor, the configuration is called a "Quarter-Active" bridge (often shortened to "Quarter-Bridge"). The three fixed resistors are termed "Completion Resistors." Because the total change in the sensor resistance is small (typically about 0.2% of its resistance, or 1000 microstrains), special high-accuracy, low-drift resistors must be used. Configurations using two sensors are termed "Half-Active" and use two completion resistors. A "Full-Active" bridge uses four sensors and no completion resistors.



In addition to mechanical strain, bridge-type sensors are available to measure pressure, force, acceleration, torque and other quantities. Most commercial pressure and force sensors are full bridge types to allow simple connection and high stability.

To convert the bridge output to a reading of strain, it is necessary to compute the Wheatstone bridge equation:

$$V_{out} = \text{Strain} * V_{exc} * GF * \text{Gain} * (N/4)$$

or, more conveniently expressed in terms of the desired reading:

$$\text{Strain} = (V_{out} * 4/N) / (V_{exc} * GF * \text{Gain})$$

where

V_{out} = Voltage signal observed at output of amplifier

N = Number of active gages, e.g. 1 for quarter-active, 4 for full-active

V_{exc} = Excitation Voltage. A higher excitation gives a higher output voltage.

GF = Gage Factor or Sensitivity of the sensor: the amount of resistance change per unit of physical input, usually 2.0 to 2.2 for a metal-foil strain gage

Gain = Amplifier Gain

To measure pressure, force or other physical input using strain-gage-based transducers, an additional item of scaling information is needed. If the full scale output of the sensor is known, then the readout may be calibrated directly in Newtons, kilograms, etc.

The Odyssey Bridge Amplifier provides DC excitation, internal or external bridge completion, amplification and automatic scaling for all types and configurations of DC bridge transducers. It also automatically computes the bridge equation above from the sensor information you enter.

Bridge amplifier "calibration" is usually done by Shunt Calibration, where a large-value resistor simulating a known value of deflection is switched into circuit. The resulting reading is taken to represent transducer full scale output. For example, a resistor of 174,650 ohms shunted across a quarter-bridge 350 ohm sensor creates an output representing 0.2% deflection or 1000 microstrains. The Odyssey Bridge Amplifier allows the use of either internal or external Shunt Calibration resistors, and offers a unique Auto-Calibration feature which automatically adjusts the gain to achieve the expected reading.

Bridge Completion

The amplifier circuit board provides space for one set of internal bridge completion resistors in any configuration, which may be switched in and out of circuit under software control. Space is also provided for one internal shunt calibration resistor. The gold-plated sockets are designed for Vishay completion resistors but may be used with others. A diagram of the board layout below shows the location of each resistor. Since quarter-bridge completion is provided automatically under software control, the most common use of internal completion is for half-bridge configuration. If half-bridge completion is installed, the signal conditioner then supports quarter-bridge, half-bridge and full-bridge configurations under software control without any component changes. Refer to Appendix A for signal conditioner removal and reinstallation instructions if needed.

Shunt Calibration

One shunt calibration resistor may be installed either internally or externally, and be switched in by software control. It shunts the upper positive leg of the bridge and causes a positive deflection.

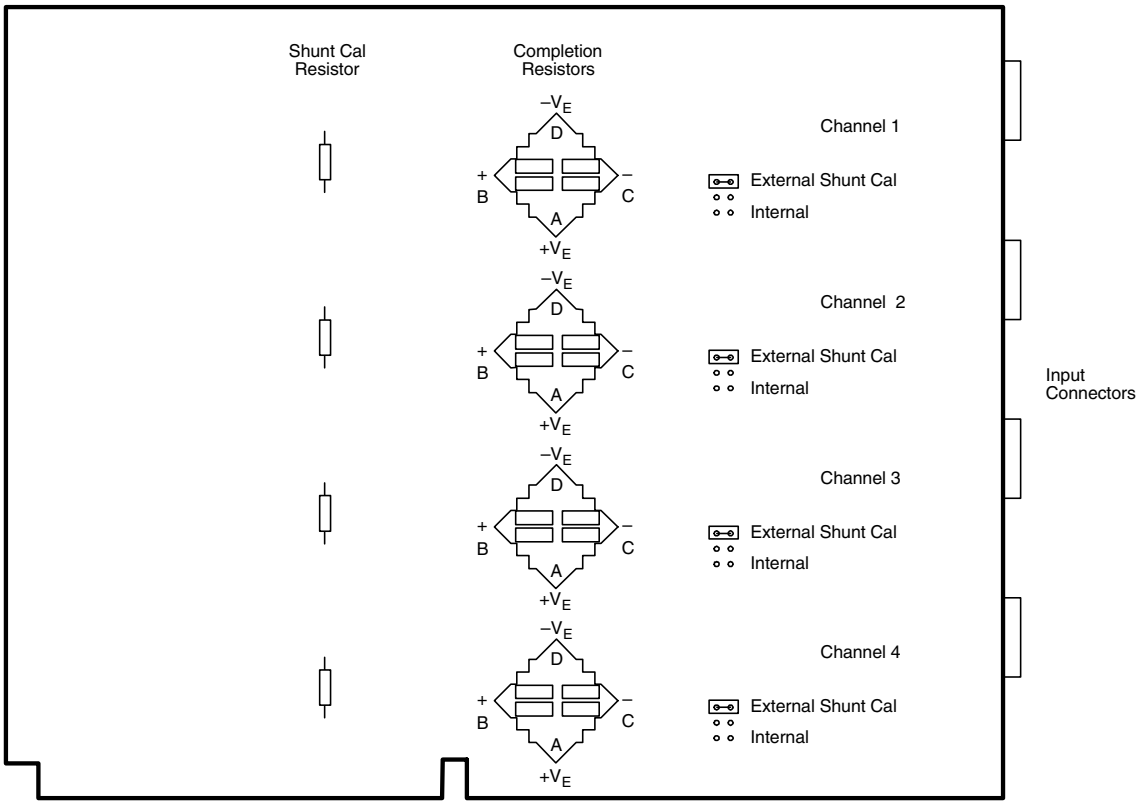
To use an **internal** Shunt Cal resistor:

1. Insert the resistor in the socket labelled on the diagram.
2. Move the Shunt Cal jumper to Internal, the lower position.

To use an **external** Shunt Cal resistor:

1. Connect the resistor between input connector pins 2 and 9.
2. Move the Shunt Cal jumper to External, the upper position.

Location of Internal Completion Resistors



The input connector is a 9-pin Hypertronics Model DO2. Pin connections are listed below.

	Description	Suggested Wire Color
Pin 1 *	3-wire ¼-bridge auto-completion	
Pin 2	Amplifier + input, Shunt Calibration Resistor	Green
Pin 3	Excitation + sense	
Pin 4	Excitation voltage +	Red
Pin 5	Shield, (Excitation return if pin 6 not present)	Black
Pin 6 *	Excitation return	Black
Pin 7 *	Excitation - sense	
Pin 8	Amplifier - input	White
Pin 9	Shunt Calibration Resistor	

* = Not on all versions, see note on next page

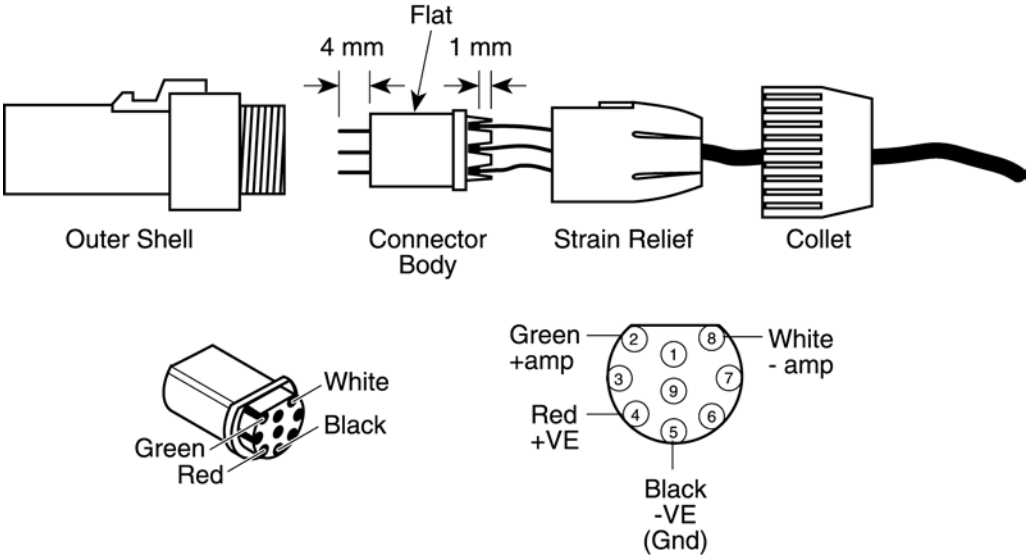
Bridge Amplifier Production Change

***** NOTE: In a production change to the Odyssey bridge amplifier, connector pins were added for an additional ground connection, additional sense connection and for three-wire quarter-bridge completion. The added pins are noted by asterisks (*****) in the connection diagrams. Amplifiers with these changes are identified by a black input connector and the use of all nine connector pins. Amplifiers without these changes are identified by a gray input connector and the presence of only six pins in the female connector.

Do not use pins 1, 6, or 7 on gray connectors.

Bridge Amplifier Connector Installation

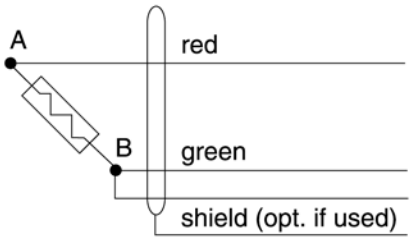
To assemble the connector, first slip the collet and strain relief over the cable, then solder or crimp the wires to the pins and insert then in the connector body. The pins must be inserted from the rear of the shell until a click is heard and felt. At this time, the pin is recessed 1 mm into the back and protrudes 4 mm from the front as shown below.



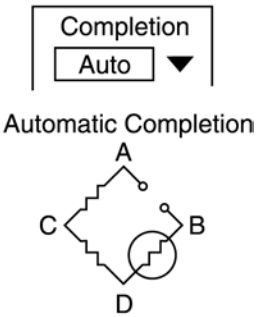
A set of ten extra male connectors is available as part number 016-900000.

Wiring connections are shown below for the most common bridge configurations. The suggested wire colors shown are based on the U.S. Western Regional Strain Gage Committee conventions. As with any high-gain amplifier, pay close attention to cable shielding and routing, avoiding noise sources when possible.

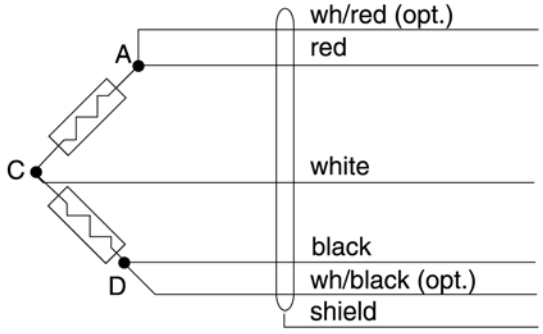
Three-Wire Quarter Bridge



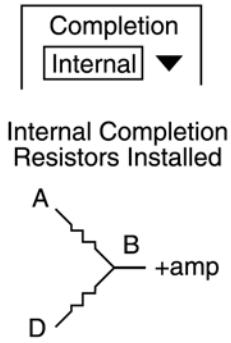
+V E	pin 4
+amplifier	pin 2
completion	pin 1*
common	pin 5



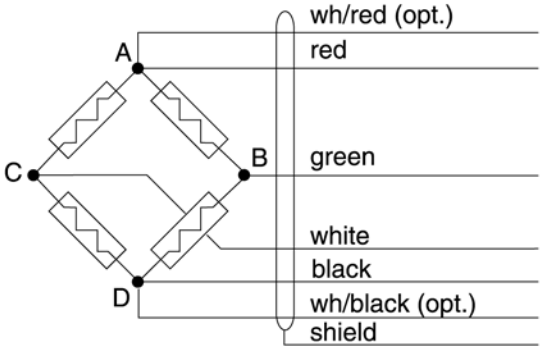
Half Bridge
(negative half active)



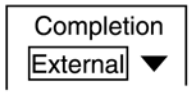
+sense	pin 3
+VE	pin 4
-amplifier	pin 8
-VE	pin 6
-sense	pin 7*
common	pin 5



Full Bridge

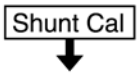


+sense	pin 3
+VE	pin 4
+amplifier	pin 2
-amplifier	pin 8
-VE (com)	pin 6* (if not available use pin 5)
-sense	pin 7*
common	pin 5



External Shunt
Calibration Resistor
(if used)

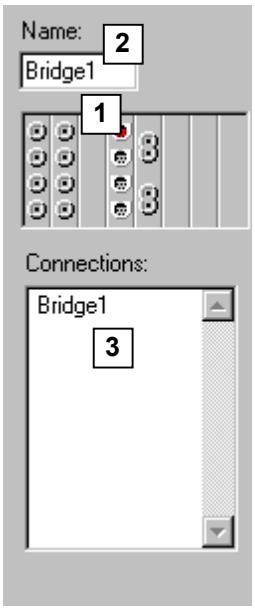
ext. shunt	pin 9
+amplifier	pin 2



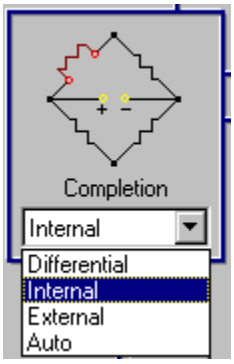
* Not available in amplifiers with grey input connectors.

To configure a bridge amplifier for an input:

1. Select an input to configure (**1**) from the graphical representation of the back panel of your Odyssey, which shows the signal conditioners currently installed. Clicking on any one of the inputs selects it and presents its settings dialog. Enter a **Name** for the input if desired (**2**). If you do not enter a name, the default name of Bridge1, Bridge2, etc. is used. The **Connections** area (**3**) displays the acquisition channel(s) connected to the selected signal conditioner. These settings are selected in the **Channels** tab of the **Recorder Configuration** dialog.



2. Select a bridge configuration from the choices in the **Completion** menu (**4**).



Auto - automatically completes a quarter bridge configuration for any sensor resistance from 100 to 1500 ohms. After you have connected your sensor and selected **Auto**, press the **Match** button (**5**). A high-stability variable resistor circuit is employed to automatically determine sensor resistance and balance the bridge. The **Match** button only appears while **Auto** completion is selected.

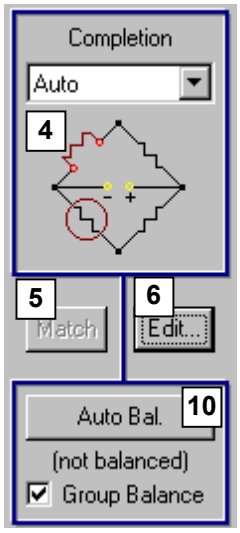
The Auto quarter-bridge completion is electrically non-inverting, with the active gage in the upper positive leg and the Auto completion circuit in the return. A positive strain on the gage produces a negative deflection as the gage increases in resistance.

Note: *Quarter-bridge connections are not highly standardized, and several different conventions exist. If you prefer to use an electrically inverting configuration so that a positive strain provides a positive indication, simply use the Invert function in the channel's Realtime Math.*

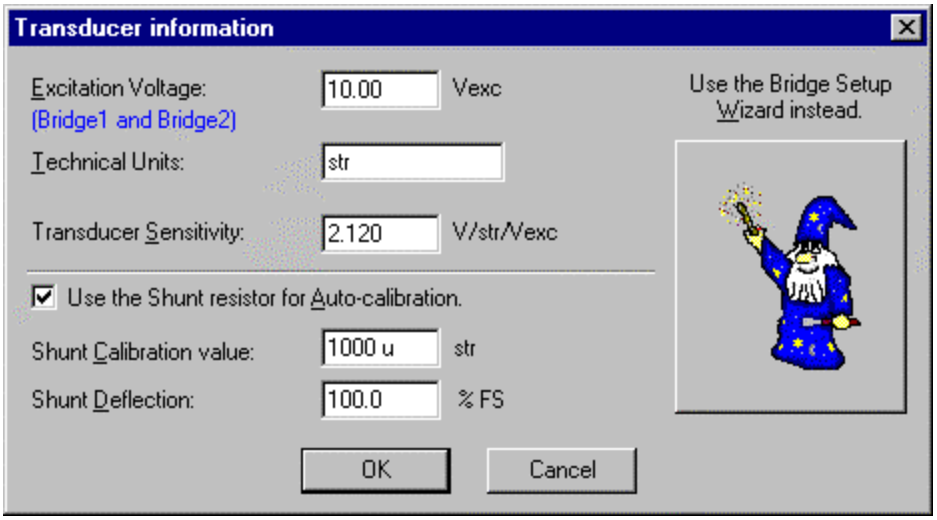
Internal - switches in the user-installed internal completion resistors. These may be installed in any configuration, but are most commonly used to complete a half-bridge. If half-bridge completion is installed, the signal conditioner then supports quarter-bridge, half-bridge and full-bridge configurations under software control without any component changes. Refer to the Completion Resistor diagram for locations.

External - switches out all internal completion resistors. All four legs of the bridge must be provided externally either by sensors or by external resistors. This setting is used for full bridge configurations. It is also useful to externally complete partial bridges of a different resistance than the internally installed resistors.

Differential - removes all excitation and bridge completion connections so the amplifier can be used as a general purpose differential amplifier. When you make this selection, the Odyssey briefly grounds the inputs to zero the amplifier.



3. Press the **Edit…** button (**6**) to enter your transducer information. The following dialog appears:



You can use the **Bridge Wizard** to set up the amplifier by answering questions about your sensor. If you are already familiar with the settings, use the procedure below for faster setup.

a. Enter the desired **Excitation Voltage**. It is adjustable in 500 steps from 0.25 V to 10 V. Channels 1 and 2 of each amplifier use the same voltage setting, and changing the excitation in either dialog affects the other channel. Channels 3 and 4 also share the same voltage setting. The bridge equation automatically includes the exact value of excitation so the units are correct at any setting.

WARNING

On systems using more than 16 sensors of 120 ohms, DO NOT set Excitation to the maximum of 10 V. Excitation of 5.0 V or less is recommended. (There is no limit on 350 Ω, 1000 Ω, or 1500 Ω sensors.)

b. Enter the Technical **Units** measured by your transducer. For a strain gage, enter "strain" or "str". Strain is automatically computed from the gage information and the gain setting. The system adds the "micro" prefix for microstrains automatically: do not enter it here. If using a pressure, force, or other transducer, enter the appropriate technical units such as Pascals, pounds, or newton-meters.

c. In the **Transducer Sensitivity** field, enter the Gage Factor of your transducer, normally 2.00-2.20 for metal foil gages, adjusted for the number of active gages in the bridge:

4 active gages	Gage Factor	(normally 2.00-2.20)
2 active gages	Gage Factor/2	(normally 1.00-1.10)
1 active gage	Gage Factor/4	(normally 0.50-0.505)

d. If using a force, pressure, or other transducer, the following calculation is necessary:

   1. Determine the transducer Output Factor in mV/V. (Typically 1-5 mV/V.)
   2. Divide the Output Factor by 1000 to convert to Volts/Volt. (Typical result .001-.005 V/V.)
   3. Divide by the transducer full scale output, such as 5000 psi, 200 Nm, or 100,000 pascals. The result will be a very small number.
   4. Enter the calculated result in the **Sensitivity** field.

   Alternatively, you can use the **Bridge Wizard** to simplify this process and have it calculate the result for you.

e. **Autocalibration** duplicates the balance and gain adjustment of a traditional analog bridge amplifier. It first auto-balances the amp, then switches in the shunt cal resistor to observe the reading. Gain is automatically adjusted to reach the expected value. If your shunt cal value is 1000 microstrain but the actual reading is only 990 ustr due to wire losses, the Odyssey will increase gain by 1% to achieve 1000. The Gage Factor is also adjusted downward slightly to the actual observed value in-circuit so the readings are accurately displayed.
   If you wish to use the Autocalibration feature, click the checkbox and enter the values below. If not, you may skip ahead to step 4.

f. In the **Shunt Calibration value** field, enter the equivalent value of the Shunt Calibration resistor you have installed. For example, if you are using a Calibration Resistor representing 1000 microstrain, enter "1000 u", "1e-3" or ".001".

g. In the **Shunt Deflection** field, enter the desired percentage of full scale to calibrate to, if not 100%.
   By default, Autocalibration will make the shunt cal value equal to 100% of full scale. A shunt cal resistor of 1000 ustr will result in a span of ±1000 ustr. If you instead enter 50% Deflection, the gain is set to make 1000 microstrain equal to half-scale, or ±2000 ustr full scale.

4. After you have entered the parameters and connected your sensors, enable the excitation voltage by pressing button (**7**).

5. Set the amplifier **Gain** control to the desired setting. The upper control (**8**) sets the gain in precise 1, 2, 5 steps. A gain of 500 is a good starting point for most strain gages. The lower control (**9**), when enabled by the checkbox, allows you to set a variable gain from 1 to 1000 in 1000 steps if desired. (Some production models have a maximum variable gain of 650 rather than 1000.) The nearby display of full scale microstrains (or other technical units) (**13**) immediately reflects the changes you make.

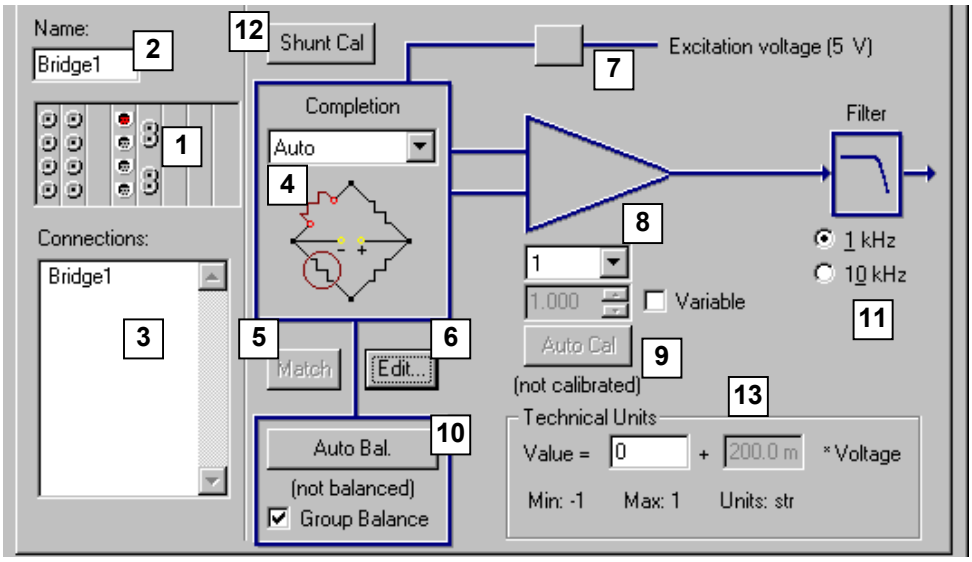
6. When all of the previous settings have been made, press the **Auto Bal.** Button (**10**) to test and balance the bridge for this channel. When balancing is complete, the message **(ok)** appears. If the message "could not balance the external sensor" appears, the bridge could not be balanced due to a large difference in voltage between the + and - inputs. Check your bridge connections and completion resistors. An autobalance should be performed whenever the signal conditioner settings are changed.

7. The checkbox **Group Balance** determines if this channel participates in the group autobalance called by the main menu, under ***Control…Auto Balance***. Check the box if this channel should be autobalanced by menu command, or uncheck it if this channel's gage is under a static strain and should not be zeroed.

8. The **Filter** control (**11**) selects analog low-pass filters of the full bandwidth or a reduced 1 kHz bandwidth to reduce noise if necessary. Full bandwidth is approximately 20kHz at gains of 100 or less, and 7kHz at gains higher than 100. More filter selections are available in the **Channels** tab dialog, where an additional digital filter of various cutoff frequencies may be enabled.

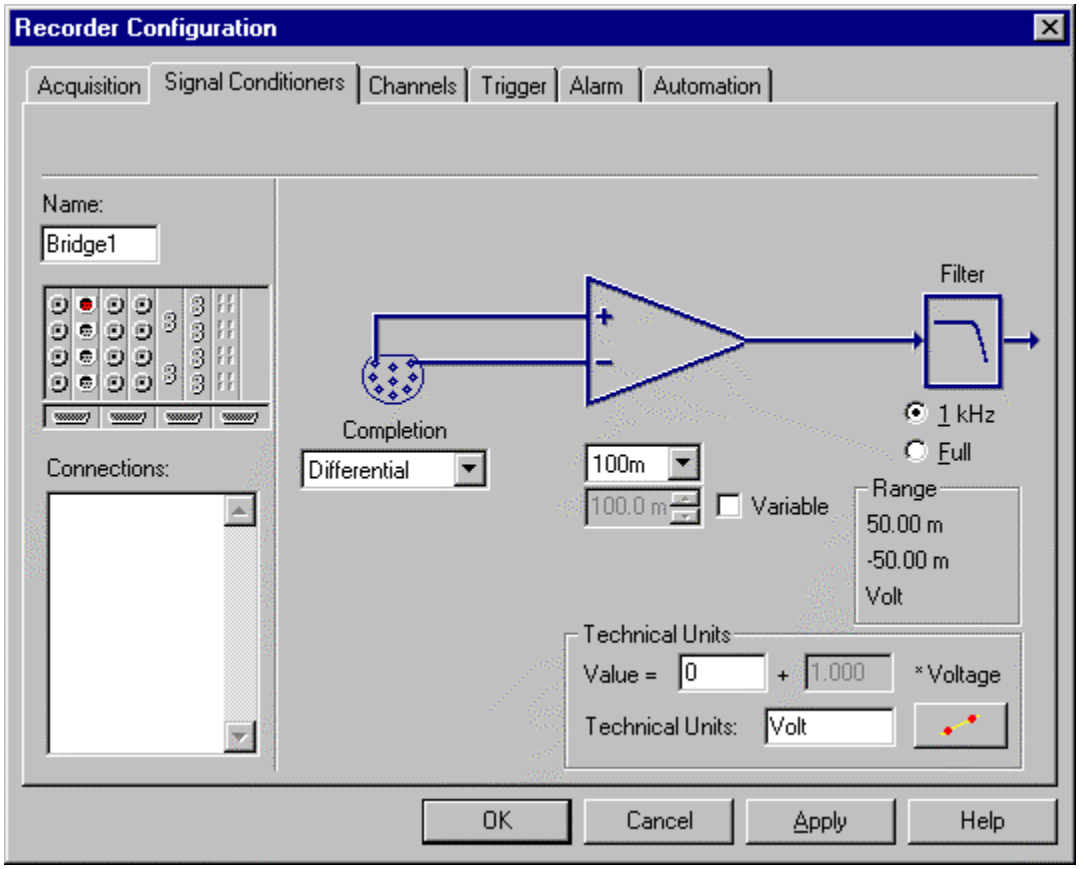
9. If desired, a **Shunt Calibration** resistor may be switched in by pressing button (**12**). The resistor shunts the upper positive leg of the bridge to deflect the signal by a known positive voltage. If the system is in Pause or Record mode, the effect is seen immediately on the trace. If a Parameter such as Mean or RMS has been enabled in the **Channel** tab dialog, you can observe that the numeric value meets expectation. The calibration resistor may be installed internally or connected externally between pins 2 and 9 of the input connector.

   The **Control** menu includes a **Group Shunt Cal** control which engages all channel's shunt calibration in one operation for quick confirmation.



Differential Amplifier Mode

The Odyssey Bridge Amplifier can also be used in a simpler mode as a general-purpose differential amplifier. By choosing Differential in the Completion selection, all bridge completion and excitation is switched out of circuit. The control panel is simplified to show only the applicable controls as shown below.



Input Connections

The amplifier is a non-isolated differential amplifier of very high common mode rejection. The differential signal is applied to pins 2 and 8 of the input connector. Unlike the other Odyssey amplifiers, the differential amplifier uses extremely high impedance inputs of more than 100 megohms. The high impedance means that both inputs must be provided with a terminating resistance to ground (connector pin 5) or the signal will float off-screen. A resistor of 1 megohm to ground is suggested if your signal source does not provide a return path. If the negative input will not be used, simply connect the input pin 8 to pin 5 ground. The common mode voltage range is ±10V on any span.

Coupling

The input coupling is DC only.

Span

In the differential mode, the Span control indicates the input span in Volts. If you enter Technical Units, they are reflected in the Range indication at the right. Like the other Odyssey amplifiers, the input is automatically calibrated whenever the span is changed. Because of the specialized bridge balancing circuitry, offset is not available in this mode. The signal is always bipolar with zero at the center of the screen.

Filter

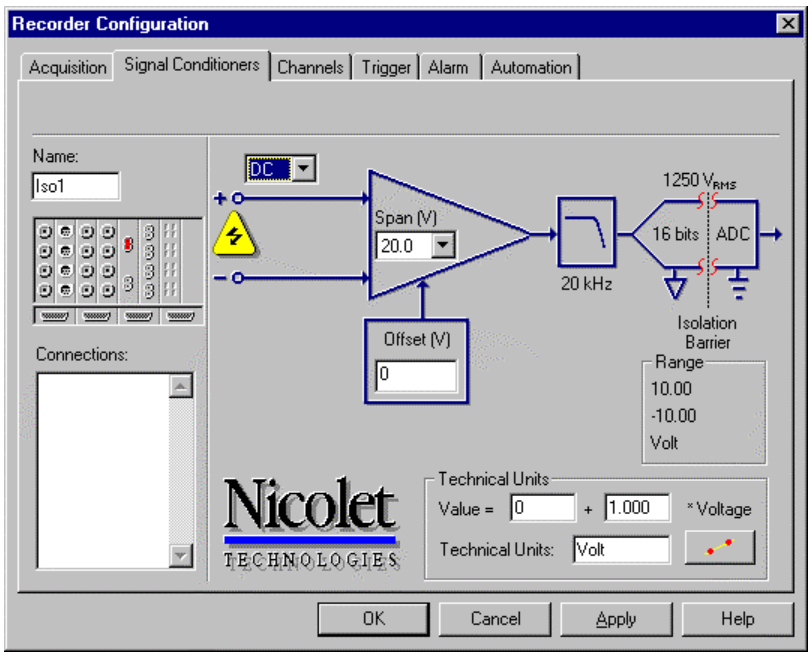
A single pole analog noise filter of 1kHz may be selected. In the normal position of Full, bandwidth is approximately 20kHz with spans of 100mv or greater, and 8kHz with spans of 20mV and 50mV. Additional digital filters may be selected in the *Channels* tab dialog.

Technical Units

The **Technical Units** entries and **Two-Point Calibration** are identical to those of the Basic Amplifier. Refer to the *Basic Amplifier* section earlier in this chapter.

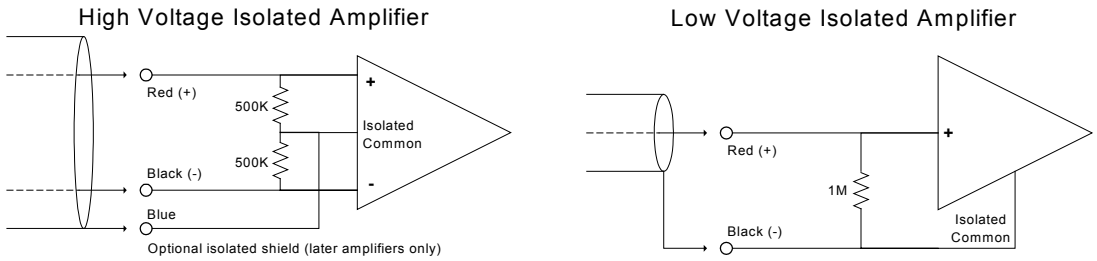
Isolated Amplifiers

The Recorder Configuration dialog below appears for each channel equipped with an Isolated Amplifier.



The two-channel **High Voltage Isolated Amplifier** offers a wide input span from 20 millivolts for current shunts to 1000 V for industrial power. It is isolated to 500 Vrms or ±1250 VDC continuously. Due to the possibility of hazardous voltages only fully insulated connectors and cables must be used. The High Voltage amplifier features AC/DC coupling and an offset (zero suppression) range of 10 times the span. For example, a 12V power supply rail may be observed closely with a span of 11 to 13 volts. Its differential inputs have a balanced impedance to isolated common for the highest possible CMRR. Later models have a third jack for isolated common to optionally shield your input cable.

The four-channel **Low Voltage Isolated Amplifier** is similar in operation, but offers voltage spans up to 100V with 250Vrms/500Vdc isolation, DC coupling and 100% offset range. Its single-ended input has 1Mohm impedance to isolated common.



Operation of an Isolated Amplifier is essentially identical to the Basic Amplifier. Refer to the *Basic Amplifier* section earlier in this chapter for detailed operation instructions.

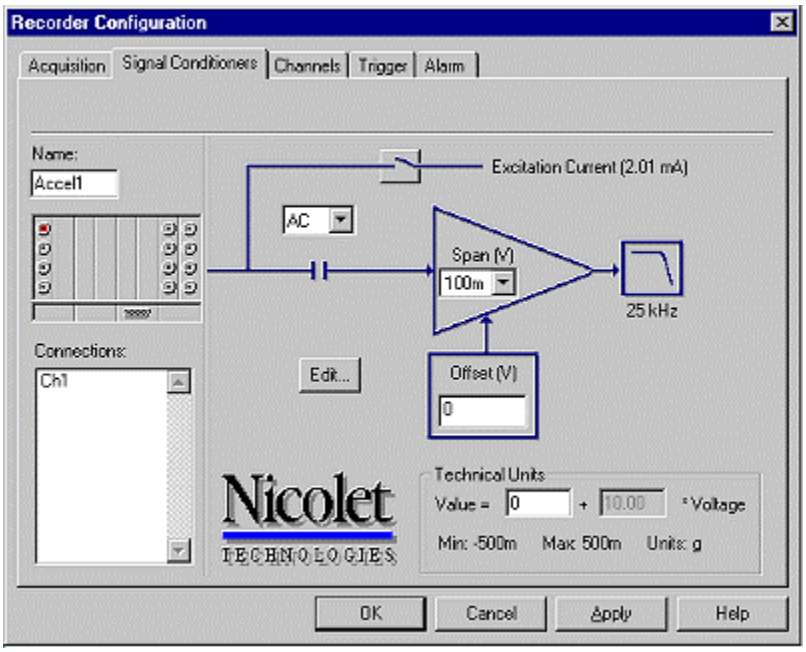
Accelerometer Amplifier

The Accelerometer amplifier provides constant-current excitation for self-powered accelerometers and force transducers such as PCB Piezotronics ICP®, Endevco Isotron® or any other transducer that requires a constant-current source. It features a high-precision 8-pole anti-alias filter of Bessel characteristics to assure very accurate phase matching as well as excellent time-domain waveform shape. The Accelerometer amplifier may also be used as a general-purpose amplifier by switching off the excitation current.

If you are using a non-amplified piezoelectric sensor (also known as a charge-mode sensor), you must use an external charge amplifier or in-line charge convertor with your Odyssey.

If you are using a piezoresistive sensor, the Odyssey Bridge amplifier provides the Wheatstone bridge input required.

The Recorder Configuration dialog below appears for each channel equipped with an Accelerometer Amplifier.



Excitation Current turns excitation current on or off. To adjust the value, use the **Edit…** dialog.

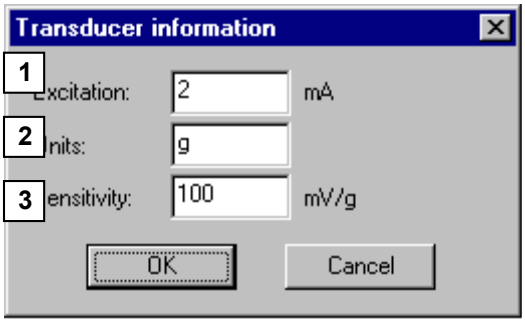
Coupling provides ground, DC, or AC coupling at 1.5 Hz. AC coupling should be used for accelerometers.

Span selects input ranges of 100 mV to 10 V full scale. The Technical Units display shows the equivalent physical units.

A zero **Offset** places the baseline at screen center and is the normal setting for accelerometers. A positive offset moves the trace upward, negative offset moves the trace down. The Technical Units display shows the equivalent physical units.

Technical Units displays the total span in physical units, calculated from the transducer sensitivity you enter in the Edit… dialog. Optionally, an offset can be added to the calculation if zero voltage is not equivalent to zero units. This is not used with accelerometers but is provided for versatility with other sensors or signals.

The **Edit** button opens a dialog where you enter the characteristics of your transducer.



To enter transducer information:

1. Enter the excitation (**1**). A constant-current source of 1 to 10 mA may be selected individually for each channel. The compliance voltage is 28V. This current provides power to internally amplified sensors or in-line remote charge convertors. A switch on the previous main dialog turns excitation current on and off.

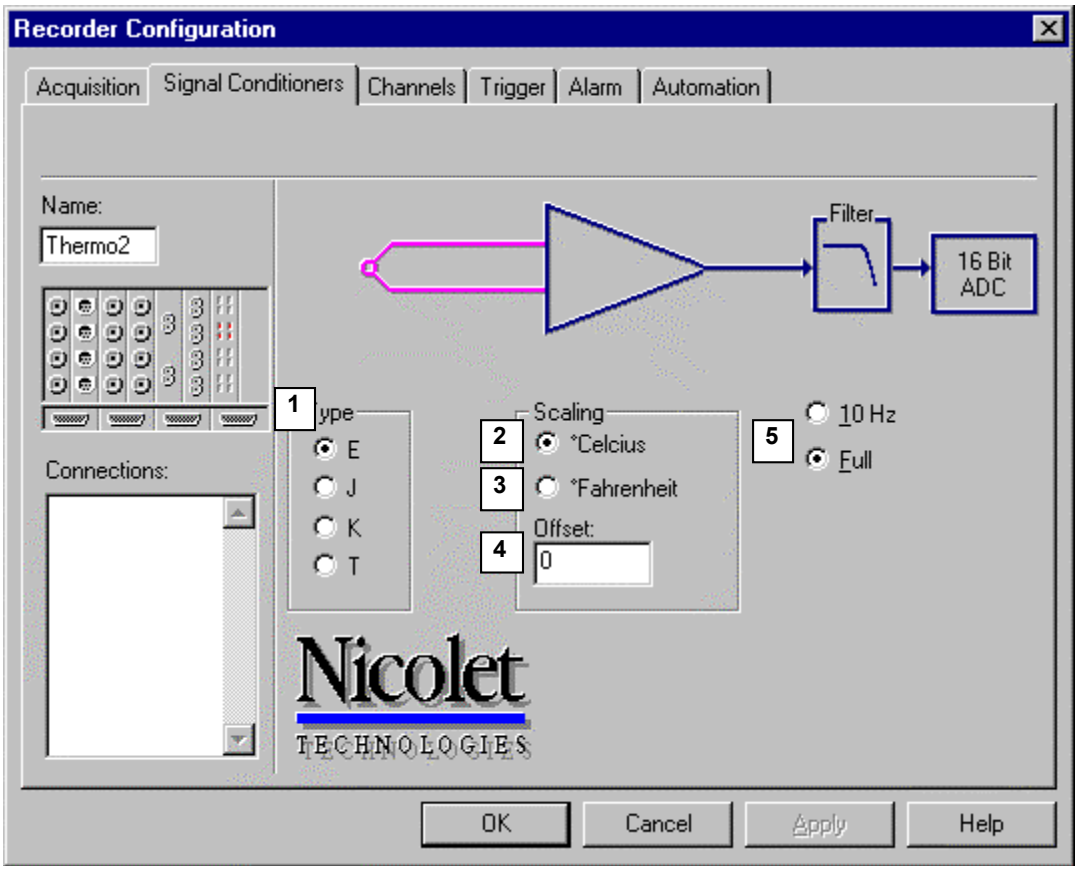
2. Enter the physical Units (**2**) sensed by your transducer. This is typically "g" for g's of acceleration or "N" for Newtons of force, but any label of up to six characters may be used.

3. Enter the Sensitivity (**3**) in millivolts output of your sensor per physical unit, from the sensor's data sheet. This is typically in the range of 0.1 to 500 mV/g for accelerometers. For use as a general-purpose voltage amplifier, enter 1000 mV/Volt. The Sensitivity and Units are automatically used to correctly scale and label the input.

4. Click **OK** to enter the transducer information, or **Cancel** to exit the dialog without making changes.

Thermocouple Amplifier

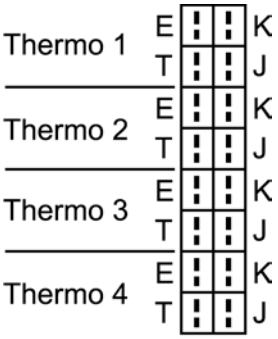
The Thermocouple Amplifier contains four channels of thermocouple inputs. Each channel contains its own Cold Junction Compensation circuit and is individually selectable between types J, K, T and E thermocouples. Separate connectors are provided for each of the four types.



To set the thermocouple amplifier:

1. Select the **Type** (**1**) of thermocouple by clicking the button for J, K, T or E.
2. Select the **°Celsius button** (**2**) for readout in degrees Celsius (Centigrade) or **°Fahrenheit button** (**3**) for readout in degrees Fahrenheit.
3. To allow compensation for slight variations in individual thermocouples, an **Offset** (**4**) entry is provided. If a particular thermocouple reads, for example 0.75 degree rather than 0.0 when placed in an ice bath, enter -0.75 in the offset to correct for the initial error.
4. An analog noise **Filter** (**5**) of 10 Hz is normally enabled to provide the most stable readings. Select Full bandwidth of approximately 7 kHz for fast-response dynamic measurements with small thermocouples.

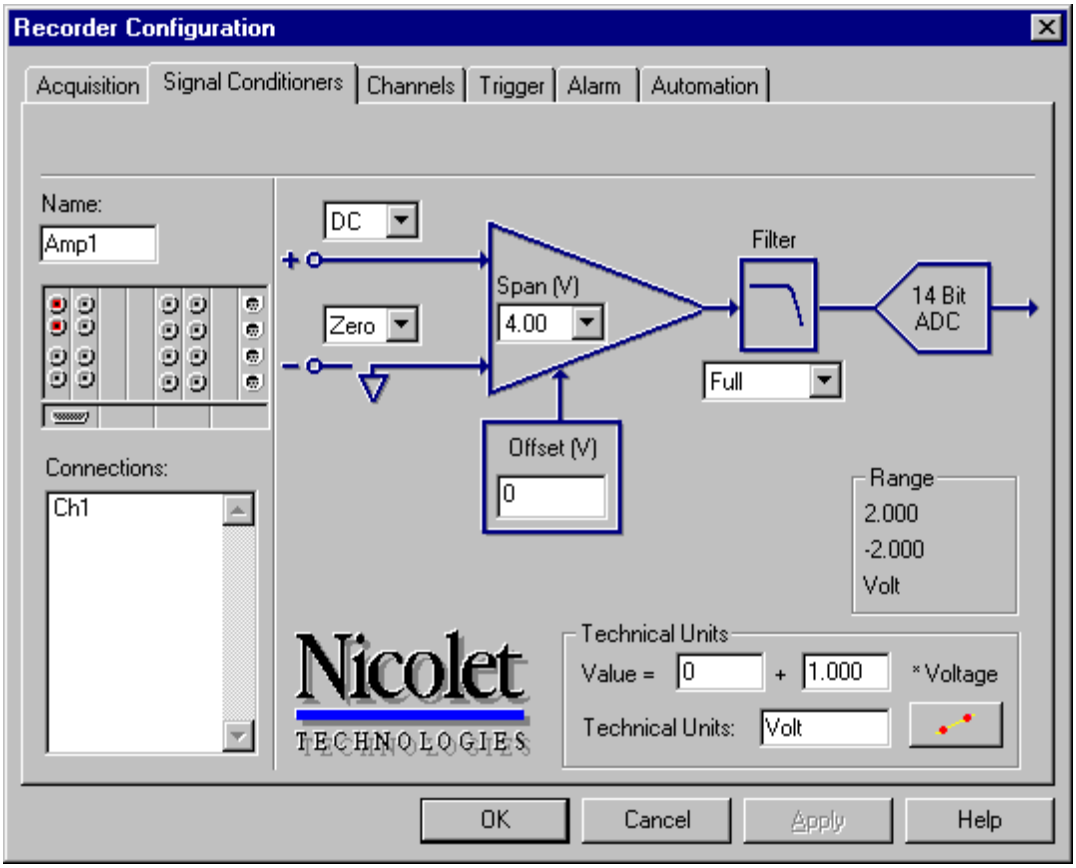
The input panel provides individual connectors for each thermocouple type to provide the correct metals for each. Only one thermocouple should be connected to each of the four channels. The colors listed are the ANSI standard designations.



K = Yellow
E = Purple
J = Black
T = Blue

OD-200 High Speed Differential Amplifiers

The Recorder Configuration dialog below appears for each OD-200 amplifier



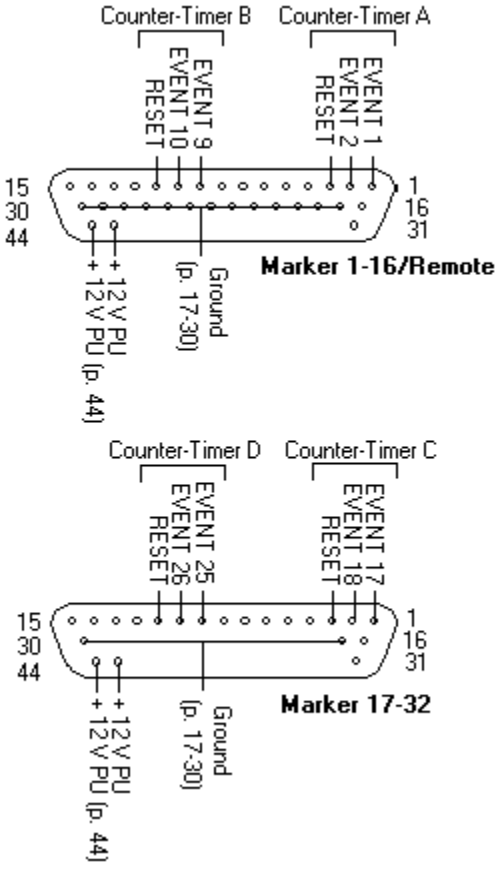
The OD-200 amplifier is a specially-designed high bandwidth differential amplifier with wide input ranges from 20 mV to 100 Volts. Its 5 MHz bandwidth complements the 10 MS/s, 14 bit digitizers. Three selectable analog filters of six-pole Bessel characteristics are provided for reduction of high frequency noise and for anti-alias protection.

The differential inputs offer separately selectable AC, DC, and Ground coupling for both positive and negative inputs.

In all other aspects, operation of an OD-200 Amplifier is essentially identical to the Basic Amplifier. Refer to the *Basic Amplifier* section earlier in this chapter for detailed operation instructions.

Counter-Timer (OD-100 Only)

Each OD-100 acquisition board is equipped with a Counter-Timer circuit that measures the digital Marker inputs for frequency, RPM, count, or position. The Counter output can be directed to a recording channel, displayed as a numeric value, have mathematical operations performed, and/or be used for trigger and alarm detection just as any of the other signal conditioners. One Counter-Timer is provided for each 8-channel acquisition card, so an Odyssey system can have up to four independent Counter-Timers. They appear as additional inputs in the Configure Signal Conditioners dialog with the default name of Counter1 for the first board, Counter2 for the second board, etc. Four modes of operation are provided, similar to a conventional frequency counter. It includes a quadrature decoder to directly count position pulses from a rotary encoder. The Counter-Timer functions are available at any sample rate, including External Clock and Cycle Bus Storage. The Odyssey acquisition rate simply determines how often the Counter-Timer reading is recorded.



Counter-Timer Input Specifications

Input Specifications:

Input Type: TTL logic level, threshold approximately +1V

Maximum Count Rate: 5 MHz

Safe Overload: 250V

Input Impedance: 10 kohms to ground

Open Circuit Voltage: <0.2V, low state

Pullup resistor (if required): 20 kohms to pin 43 or pin 44

Technical Note: To maintain a high counting bandwidth, the Counter-Timer uses no input filtering. Signals to be counted must have a fast transition through the TTL threshold. If slow-moving analog signals are applied, you will experience false counts due to the small amount of noise at the threshold level. For some applications such as magnetic crankshaft pickups it will be necessary to condition the input signals with an external comparator, amplifier or Schmitt trigger circuit.

To configure the counter timer:

1. To enter **Counter-Timer** settings, select the **Configure…Signal Conditioners** dialog and click on the digital input connector on the rear panel graphic.

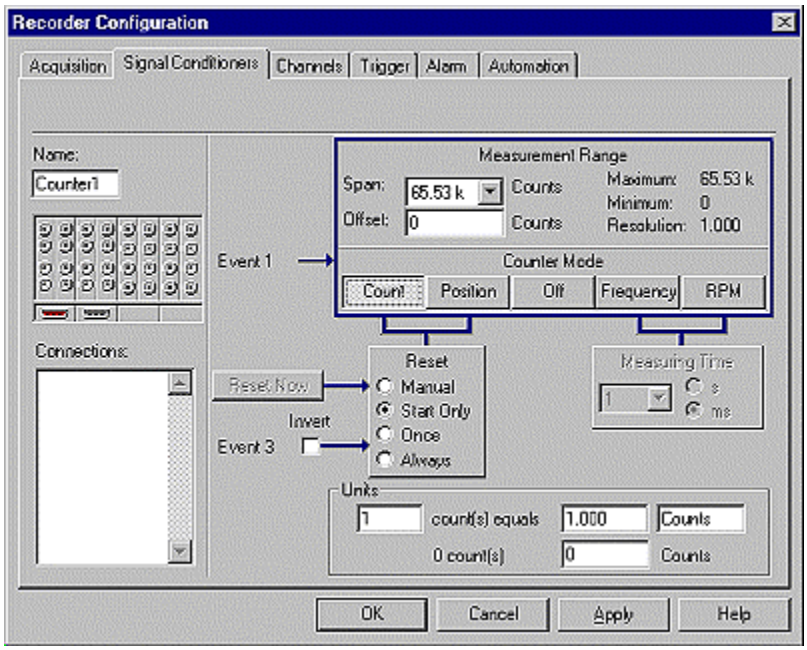
3. The Counter-Timer Recorder Configuration dialog appears.

4. Select one of the four available modes or turn the counter mode off. The Counter-Timer functions on digital marker inputs only. To measure the frequency of an analog input, choose the Period parameter in the Configure Channels dialog.

Count Mode

Low-to-high transitions on the first marker channel (default name Event 1 on the first board) are counted and totalized. The count begins at zero upon a specified Reset condition. The 32-bit counter hardware can totalize 4.3 billion counts before rolling over to zero. Span and Offset controls are provided in order to display and record the desired Range. The output is a scaled 16-bit value which may be routed to any recording channel. The counter hardware accepts input frequencies of up to 5 MHz.

The third marker input (default name Event 3) is used as a Reset signal, to reset and hold the count at zero whenever it is true. Typical applications are to reset the count at the index position of an encoder, or to start counting at a specific time.



In the **Measurement Range** area, the **Span** control determines the range of counts on screen. The **Offset** control determines the minimum reading at the bottom of the screen. The display of **Maximum**, **Minimum**, and **Resolution** reflect the changes you make and the resulting measurement range.

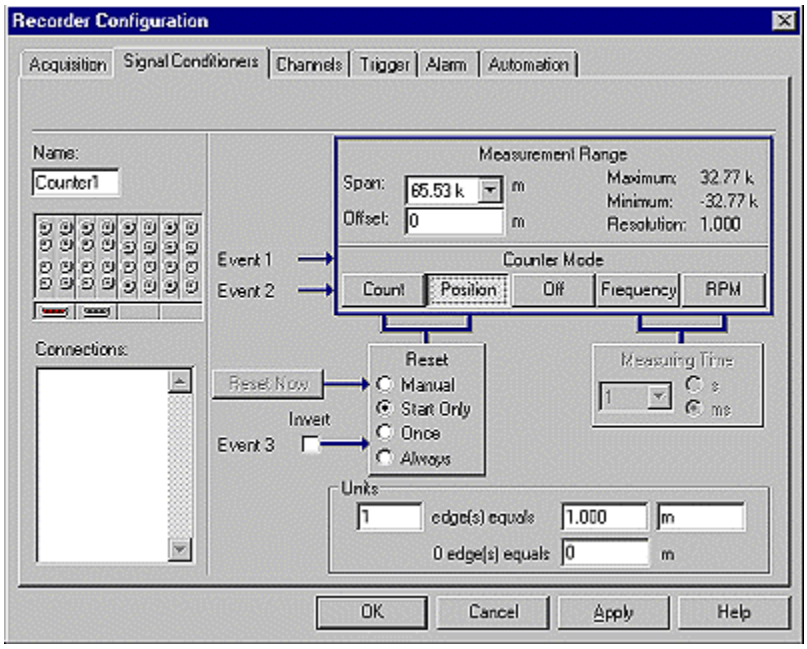
If the **Invert** box is blank, the **Reset** input is active when at a TTL high state (above 1 V). If the **Invert** box is checked, the **Reset** input is active when at a TTL low state. When not connected, the **Reset** input is pulled to a low state. In the **Reset** area**, Manual** means reset the count to zero only when the adjacent button is clicked: the count is retained and updated continuously in the hardware even when the Odyssey is not recording. **Start Only** means the counter is reset to zero when recording begins and counts continuously until stop. **Once** means the Reset input will reset the Counter the first time it is activated, and counting will continue until stop. **Always** means the **Reset** input will reset the counter to zero each time it is activated. Counting starts again whenever the **Reset** input is deactivated.

Units is an optional feature that allows scaling of the counter output to indicate physical units, such as 1 count = 0.001 meter.

Position Mode

The first two marker channels (default names Event 1 and Event 2 on the first board) are used by a decoder to count forward and reverse pulses from a quadrature encoder. Each edge equals one count. The count begins at zero upon a specified Reset condition, and counts up or down in response to the encoder pulses continuously until Reset. The 32-bit counter hardware can totalize +/-2 billion counts before rolling over. Span and Offset controls are provided in order to display and record the desired Range. The output is a 16-bit value which may be routed to any recording channel. Input pulse rates of up to 1.25 MHz may be counted.

The third marker (default name Event 3) is a Reset signal, to reset and hold the count at zero whenever it is true. A typical application is to reset the count at the index position of an encoder.



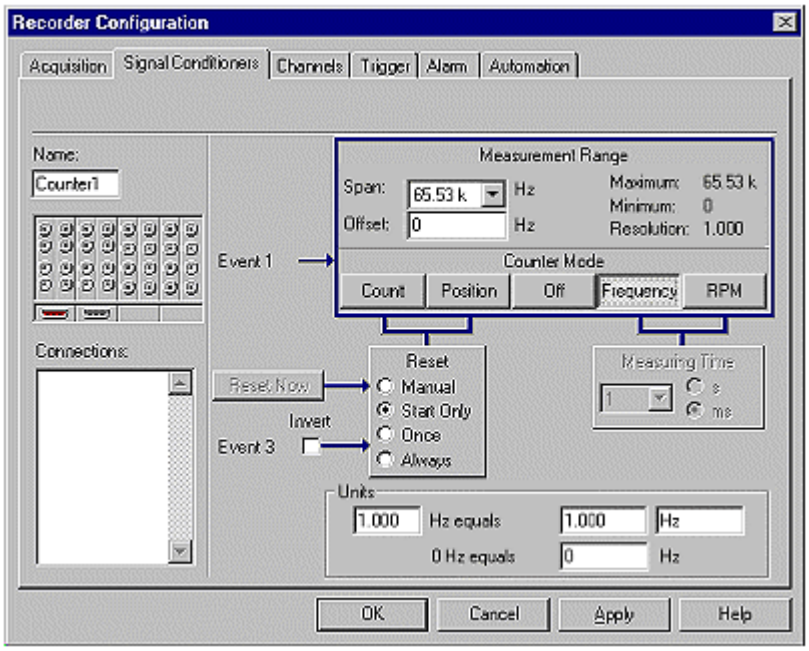
In the **Measurement Range** area, the **Span** control determines the range of counts on screen. The **Offset** control determines the minimum reading at the bottom of the screen. The display of **Maximum**, **Minimum**, and **Resolution** reflect the changes you make and the resulting measurement range.

If the **Invert** box is blank, the **Reset** input is active when at a TTL high state (above 1 V). If the **Invert** box is checked, the **Reset** input is active when at a TTL low state. When not connected, the **Reset** input is pulled to a low state. In the **Reset** area**, Manual** means reset the count to zero only when the adjacent button is clicked: the count is retained and updated continuously in the hardware even when the Odyssey is not recording. **Start Only** means the counter is reset to zero when recording begins and counts continuously until stop. **Once** means the Reset input will reset the Counter the first time it is activated, and counting will continue until stop. **Always** means the **Reset** input will reset the counter to zero each time it is activated. Counting starts again whenever the **Reset** input is deactivated.

Units is an optional feature that allows scaling of the counter output to indicate physical units, such as 1 count = 0.001 meter.

Frequency Mode

Low-to-high transitions on the first marker channel (default name Event 1 on the first board) are counted during a specified time and converted to frequency in Hertz. Operation is similar to a conventional frequency counter, with measuring time selectable from 1 ms to 50 s. Span and Offset controls are provided in order to display and record the desired Range. For example the Range may be set to measure from 9 kHz to 10 kHz to allow a close view of small changes in frequency. A new reading is presented at the end of each measuring period. A short measuring time allows faster updates, while a longer measuring time allows finer resolution of small changes. The current maximum/minimum values and resolution are always displayed so you can choose the most suitable settings for your application. The maximum input frequency for the counter is 5 MHz.



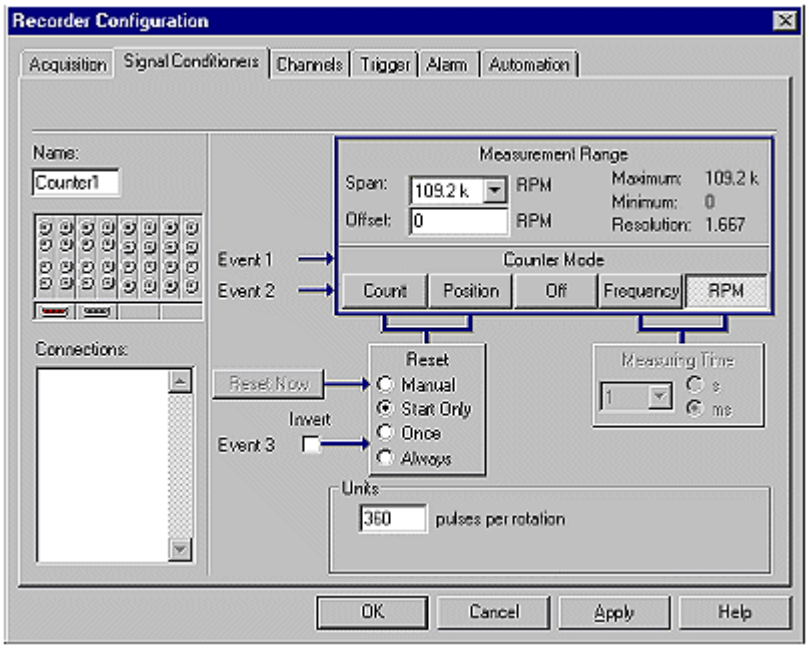
In the **Measurement Range** area, the **Span** control determines the range of counts on screen. The **Offset** control determines the minimum reading at the bottom of the screen. The display of **Maximum**, **Minimum**, and **Resolution** reflect the changes you make and the resulting measurement range.

The **Measuring Time** sets the gate time during which input pulses are counted. A fast **Measuring Time** gives quick updates. A slow **Measuring Time** gives finer resolution of small changes. A new reading is available at the end of each **Measuring Time**.

Units is an optional feature that allows scaling of the counter output to indicate other physical units, such as for use with frequency-output transducers.

RPM Mode

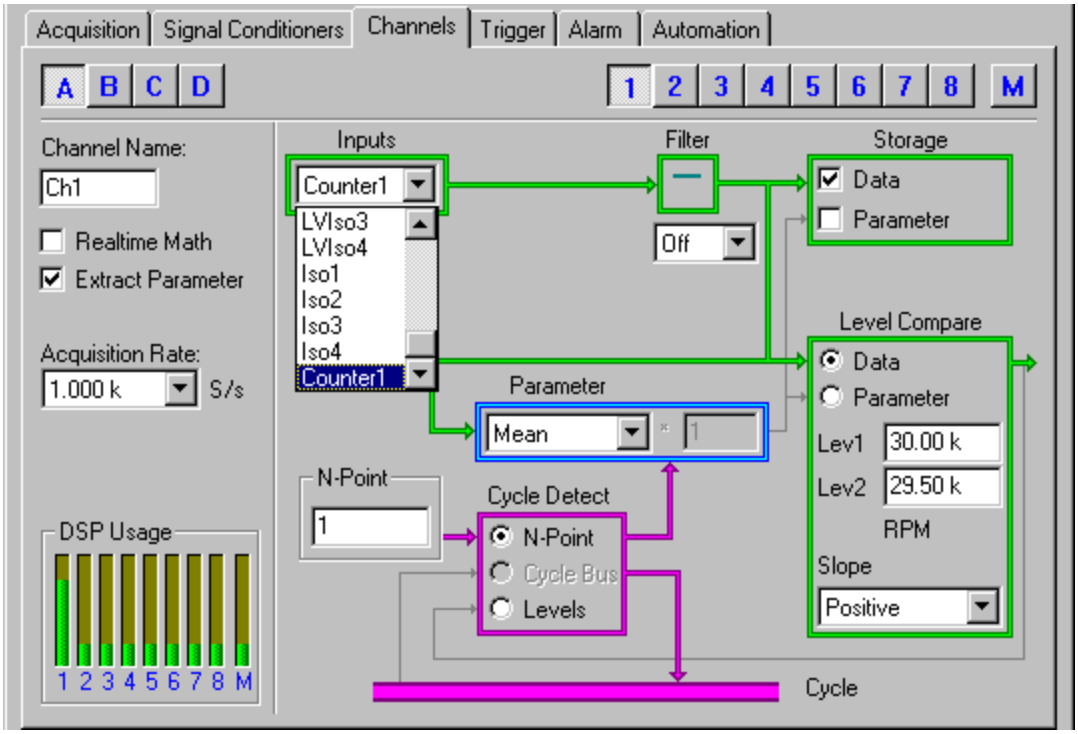
Pulses on the first marker channel (default name Event 1), typically from a shaft encoder, are counted during a specified time and converted to Revolutions Per Minute. The number of pulses per rotation MUST be entered in the Units box so the Odyssey can accurately identify each revolution. Operation is similar to a conventional frequency counter, with measuring time selectable from 1 ms to 50 s. Span and Offset controls are provided in order to display and record the desired Range. For example the Range may be set to measure from 900 to 1000 RPM to allow a close view of small changes in speed. A new reading is presented at the end of each measuring period. A short measuring time allows faster updates, while a longer measuring time allows finer resolution of small changes. Both resolution and response time are improved by using a high-resolution encoder, for example 360 pulses per revolution rather than 32. The current maximum/minimum values and resolution are always displayed so you can choose the most suitable settings for your application. The maximum input frequency for the timer hardware is 5 million pulses per second, or over 80,000 RPM with a 3600-pulse encoder.



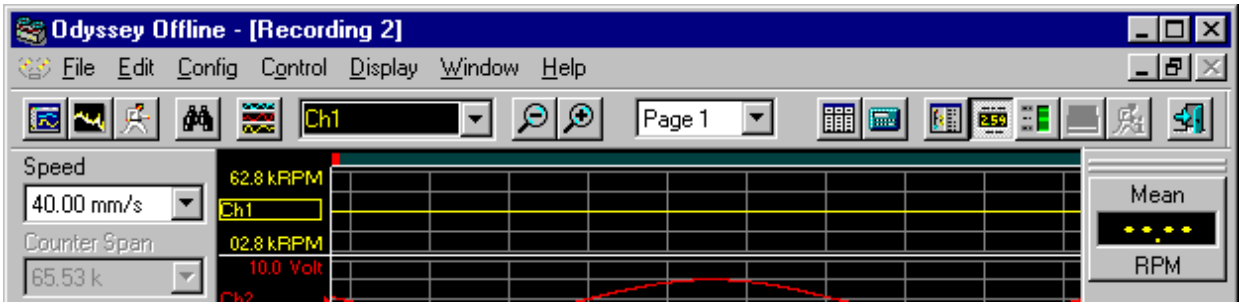
In the **Measurement Range** area, the **Span** control determines the range of RPM on screen. The **Offset** control determines the minimum reading at the bottom of the screen. The display of **Maximum**, **Minimum**, and **Resolution** reflect the changes you make and the total measurement range.

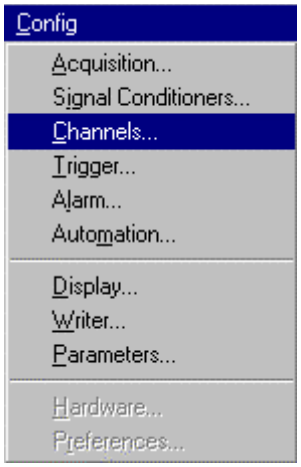
The **Measuring Time** sets the gate time during which input pulses are counted. A fast **Measuring Time** gives quick updates. A slow **Measuring Time** gives finer resolution of small changes. A new reading is available at the end of each **Measuring Time**.

A **Units** entry is required for RPM measurement. Enter the number of pulses that represent one revolution. The minimum value is one. Integer values are required.



2. Select the channel in which you would like to use the Counter-Timer. The example above shows Ch1 being used.
3. Pull down the **Inputs** list and scroll to the bottom. The Counter will be the last item in the list.
4. This channel will now display, record, filter, trigger and make real-time measurements on the Counter-Timer output including the correct scaling.

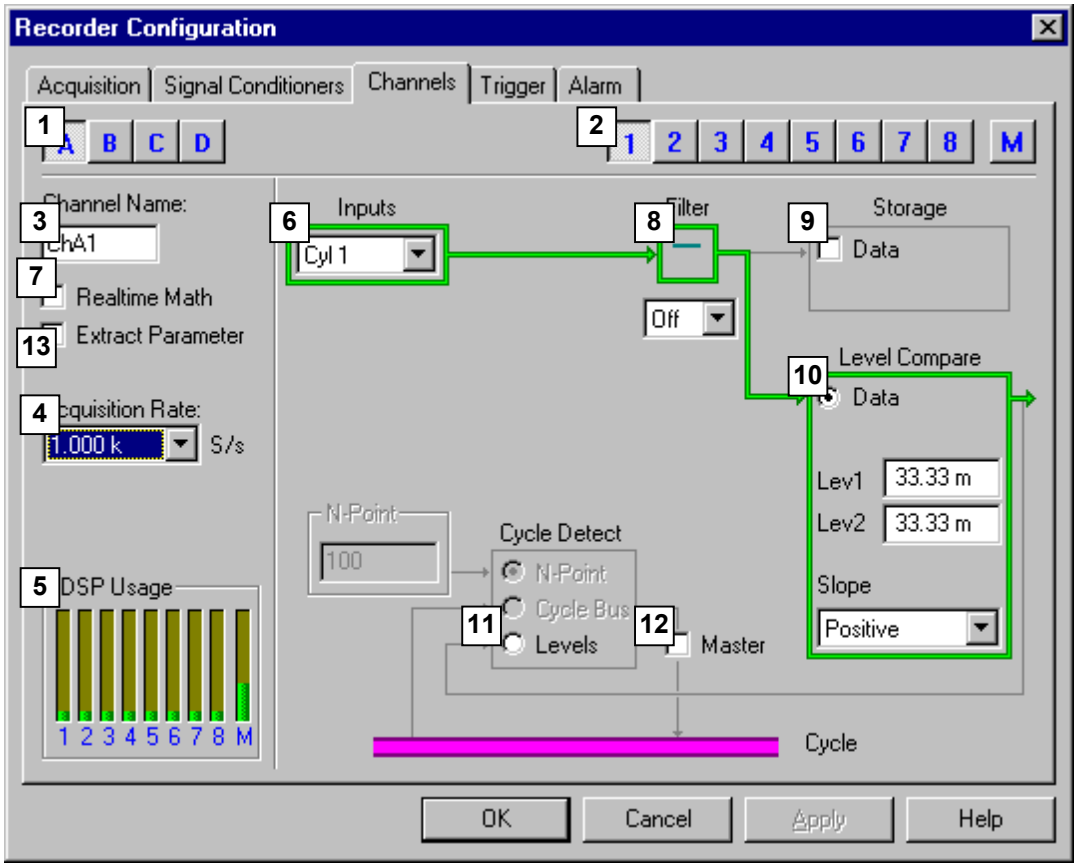




Channels

The ***Channels*** command opens the **Channels** tab of the **Recorder Configuration** dialog, which allows you to configure the acquisition channels.

Some features will vary depending on the acquisition cards you have installed. These differences are noted in the text.

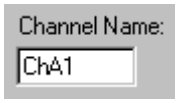


To configure the channel setups:

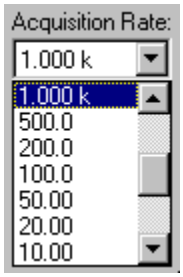
1. If your system has more has more than one acquisition board, select the board to configure (**1**). Board A refers to the first board, board B the second, etc.

2. Select a channel to configure (**2**). There are four or eight analog channels and eight digital marker (M) channels on each acquisition card. Selecting the marker channel changes the options available in the **Channels** tab and is described later in this section.

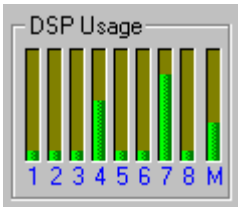
When you click on a channel, the channel name appears (**3**). You can change the channel name by highlighting the current name and typing a new one. This name is displayed on-screen and may be different from the name of the signal conditioner. For example, a channel that multiplies a voltage by a current might be named "Power".



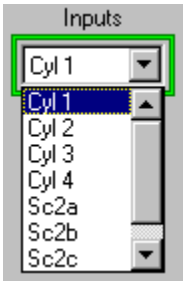
3. For your convenience, you can choose to change the current **Acquisition Rate** (**4**) using the drop down menu. If the system is configured for dual rates, both the slow and fast rates appear and can be changed. Changing the acquisition rate(s) in this tab also changes the acquisition rate(s) in the **Acquisition** tab. By default, all boards acquire at the same rate. If you previously cleared the checkbox "All boards" in the acquisition tab, each board can have a different sample rate.



4. **OD-100 Only**: The OD-100 acquisition board contains a DSP for each channel providing real-time calculations, digital filtering and other functions. View the **DSP Usage** (**5**) using the active bar chart. As you make changes, monitor how much the different configurations affect each DSP. If a bar in the chart reaches 100% and turns red, you have exceeded the processing capability of the DSP and you should either lower the sampling rate or simplify the calculations for that channel. It is also possible you have selected a parameter such as Period which requires a repetitive input, but no cycle crossings are being found. If any of the bars turn red, the Parameter calculations for that channel may not include all samples. However, the data acquisition and recording functions take the highest priority and are never interrupted.
Note: It is normal for the bars to momentarily flash red when entering the dialog or when making changes.



5. In the default configuration, the first signal conditioner is automatically connected to the first acquisition channel, etc. If you changed an input name in the **Signal Conditioners** tab, the revised name appears in this menu. However, any signal conditioner may be routed to any channel with a drop down menu (**6**). If you have multiple signal conditioners, you may connect a bridge amplifier to channel 1 today but a thermocouple amplifier in slot 8 for tomorrow's test.



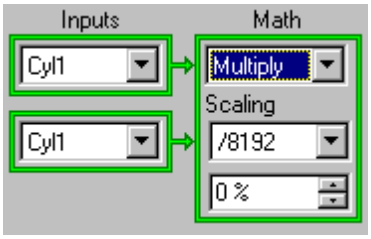
Any signal conditioner may be used with any recording channel with the following exceptions. The system software automatically excludes these combinations from the drop down menu.

- An OD-100 Counter-Timer input cannot be used on acquisition boards other than the one on which it resides.
- The OD-200 acquisition board cannot select a thermocouple input.
- The OD-200 high speed amplifier cannot be re-routed to other OD-200 channels due to the high speed data.

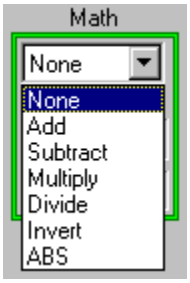
Realtime Math (OD-100 Only)

6. **OD-100 Only**: You can choose to apply a mathematical function to the channel by clicking on **Realtime Math** (**7**).

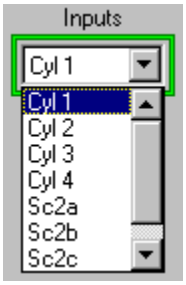
New options appear in the tab.



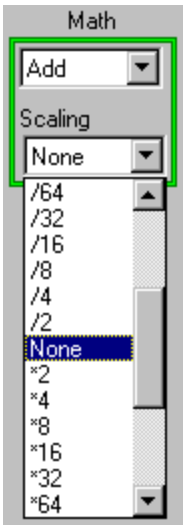
7. Select a mathematical function to perform on the input(s).



8. Depending on the function you selected, choose the required input(s). The unary operators such as invert and absolute value require only one input while the binary operators such as add, subtract, and multiply require a second input. The DSP in each channel can perform mathematics on any two signals and create a virtual channel as a result. Signals to be added or subtracted must be set to the same span and Technical Units scaling. A change in span to either signal conditioner will automatically be applied to both.



9. If required, select a scaling factor for the result from the drop down menu. The result of a subtraction or division, if too small to comfortably view, may be scaled upward. The result of a multiplication will generally be large and may be scaled downward to keep it on screen. While in Record or Pause mode, the front panel Span control will also increase and decrease the Math scaling. (This does not affect the signal conditioner span for the input signals. If you wish to change the signal conditioner's span for one of the Math inputs, use the *Config…Signal Conditioners* dialog.)

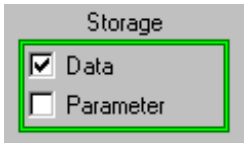


10. If required, select or enter an offset in the Math Scaling. This control repositions the math trace vertically for more convenient viewing. A positive offset moves the trace upward. While in Record or Pause mode, the front panel Offset knob will also change the Math Offset. (This does not affect the signal conditioner offset for the input signals. If you wish to change the signal conditioner's offset for one of the Math inputs, use the *Config…Signal Conditioners* dialog.)

11. **OD-100 Only**: If desired, select a low pass filter (**8**) from the drop down menu. This engages a digital FIR filter that provides anti-alias protection at all sample rates. For your convenience, the Auto selection automatically tracks the acquisition rate, always using a filter cutoff frequency of approximately ¼ the acquisition rate. Other manual selections are available. For example, an acquisition at 1 kS/s may be filtered to a bandwidth of 250 Hz, 125 Hz, 50 Hz, or 25 Hz. Nicolet recommends use of a filter unless you know your incoming signal is free of high frequencies.

Advanced Topic: Time Alignment of Filter. When the Auto filter is used, all channels on a card are time-delayed by an equal (small) amount so that filtered and unfiltered data remain exactly aligned in time. Other OD-100 cards at the same sample rate will also be aligned if at least one channel has an Auto filter. This is an advantage that cannot be achieved by an analog filter. If lower frequencies than the Auto setting are used, the lower bandwidth channels will be delayed slightly with respect to higher bandwidth channels. This is the same effect as an external analog filter, which similarly causes a slight but measurable delay. Cards using different sample rates or filter frequencies may also be slightly delayed.

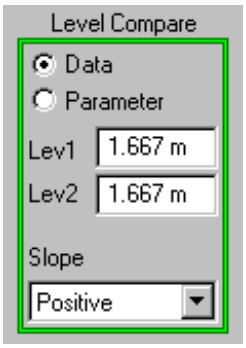
12. Click **Data** in the **Storage** area to store the data on the hard disk. This is the default condition. The **Storage** area (**9**) becomes active when you click **Data** or **Parameter**. (Parameter setup is discussed in a following section.) If neither box is checked, no data from this channel will be stored. More recording time is then available for other channels. Channels that are not stored may still be monitored on-screen and used as a trigger source. However, their traces are a grey color to indicate they are not being stored.



This completes the basic channel setup. If you would like to set up triggers or real-time measurements, continue with the following steps.

Trigger Level Compare

12. To detect level crossings for a trigger or alarm, you may specify thresholds in the **Level Compare** area (**10**).



13. Select a S**lope** from the drop down menu.
    - In **Positive** or **Negative** slope, the two levels are a fully-adjustable hysteresis window that rejects low-amplitude noise. For positive slope, set **Lev1** to the desired trigger level, in engineering units. Set **Lev2** to a value slightly lower. You may use "k" for kilo-, "m" for milli-, "u" for micro-, etc. A signal must cross both levels in the same direction before a trigger is detected.
    - In **Dual** slope, the two levels are individual setpoints: a trigger will be generated when the channel drops below the lower or rises above the upper. Set **Lev1** to the upper setpoint value, **Lev2** to the lower.

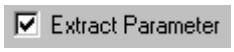
    You select which channels cause a system trigger in the **Trigger** tab described later in this Chapter. The Level Compare may also be used to cause an Alarm output (configured in the **Alarm** tab).

    If you will not be using the real-time Parameter measurements (OD-100 only), you may proceed to the next section on Digital Marker Inputs.

14. **OD-100 Only**: On the OD-100 acquisition board, you can choose to perform the Level Compare on a calculated Parameter rather than on the raw Data. For example, this powerful feature allows you to trigger on a lower-than-expected peak or RMS value or an unusual frequency. If you select **Parameter** in the **Level Compare** area, the outlines become blue, denoting that these functions are now related to the extracted parameter. A measured value above or below the levels you set will cause a trigger. To use this feature, you must first define a Parameter measurement as in the next section. Then set **Lev1** and **Lev2** to the desired values.

Parameter Extraction and Cycle Detection (OD-100 Only)

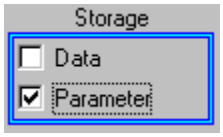
14. On the OD-100 acquisition board, you can choose to calculate a real-time parameter on any channel by clicking on **Extract Parameters** (**13**).



The Parameter area appears, allowing you to select a parameter to measure using the drop down menu. One Parameter can be computed by each channel.

Each measurement you enable will automatically be added to the Parameter display. Values are updated in real time as they are calculated. (Refer to menu item *Configure... Parameters* in a later section for details of setting up or modifying the Parameter display.)

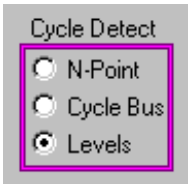
You may also choose to record the Parameter values rather than the raw data by selecting **Parameter** in the **Storage** area. A "virtual channel" of the calculated measurements is then recorded.



15. Select a time period for the measurement in the **Cycle Detect** area. The incoming signal will be analyzed by the DSP during this time, and an updated result displayed at the end of each time period. You may select from a measurement time of:

    N-Point: a fixed time specified as a number of samples,
    Cycle Bus: a period broadcast by another channel, or
    Levels: the period between two level crossings (requires a periodic signal.)

To select a set time period, click on **N-Point** and enter the number of samples. For example, to view or store the mean value of one second of data at 1kS/s, enter 1000.
To use a period determined by another channel, click on **Cycle Bus**.
To use this channel's levels for automatic cycle detection, click on **Levels**. Each level crossing is then used to detect a cycle of a periodic signal for very accurate RMS, period, cyclic peak or cyclic area readings.



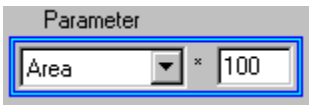
The maximum number of points that can be analyzed for each reading is 65,535. For periodic signals, a full cycle of the input signal must occur within 65,535 samples at the current acquisition rate. This is not a significant limitation in practice because, even at the maximum acquisition rate of 100 kS/s, you can analyze a time interval as long as 0.65 sec or a frequency as low as 1.5 Hz. If you are using Dual Rate acquisition, the parameters are always computed at the high rate so that even the briefest events will be included.

Description of Parameter Calculations

This section contains a description of the Parameter calculations. Each Parameter is measured over a time interval you select, using either a fixed number of samples (N-point) or automatic cycle detection (Levels or Cycle Bus.)

The Parameter measurements are performed by each channel's DSP using input data at the currently selected acquisition rate (or if using Dual Rate, the Fast rate.) The measurements are updated at the end of each selected period. For example, an N-point setting of 1000 at 1kS/s results in an update each second. The parameters may be displayed numerically, used as a trigger source and/or recorded as a virtual channel. If they are recorded as a channel, the most recent reading is held constant and repeated in the data stream until a new update is available.

- **Area**: the numerical integration (summation) of all samples in the selected period, multiplied by the sample interval. For a voltage input, the output is expressed in Volt-seconds. The integration is reset and begins at zero at the beginning of each selected period. Because the integration may produce a very large or a very small value, an additional control is provided to scale the result for convenient viewing. You may enter a multiplier to enlarge or reduce the result without affecting the correct numerics.



- **Duty Cycle**: positive and negative crossings of the median voltage are detected by the DSP. The ratio of time above the mid-point to time below the mid-point is expressed in percentage Duty Cycle. For Duty Cycle only, cycle detection is automatic: there is no need to set the Level Compare or number of points. An auto-level algorithm is used that seeks the mid-point of the signal's amplitude to automatically detect crossings. Requirements:

  a.) At least one full period must be detected within 65,535 samples at the current acquisition rate.
  b.) The input signal amplitude must be greater than 1% of the full span.

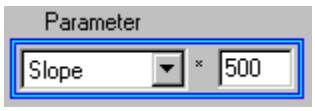
- **Max**: the absolute Maximum value encountered during the selected period.
- **Mean**: the arithmetic Mean or Average of all samples in the selected period.
- **Min**: the absolute Minimum value encountered during the selected period.
- **Pk-to-Pk**: the peak-to-peak value of all samples in the selected period. The Minimum value is subtracted from the Maximum value.
- **Period**: positive crossings of the Level Compare are detected. The time between them is measured and displayed as Period. Requirements:

  a.) At least one full period must be detected within 65,535 samples at the current acquisition rate.
  b.) The Level Compare must be set to a value that is crossed with each cycle.
  c.) Cycle Detect must be switched to Levels.

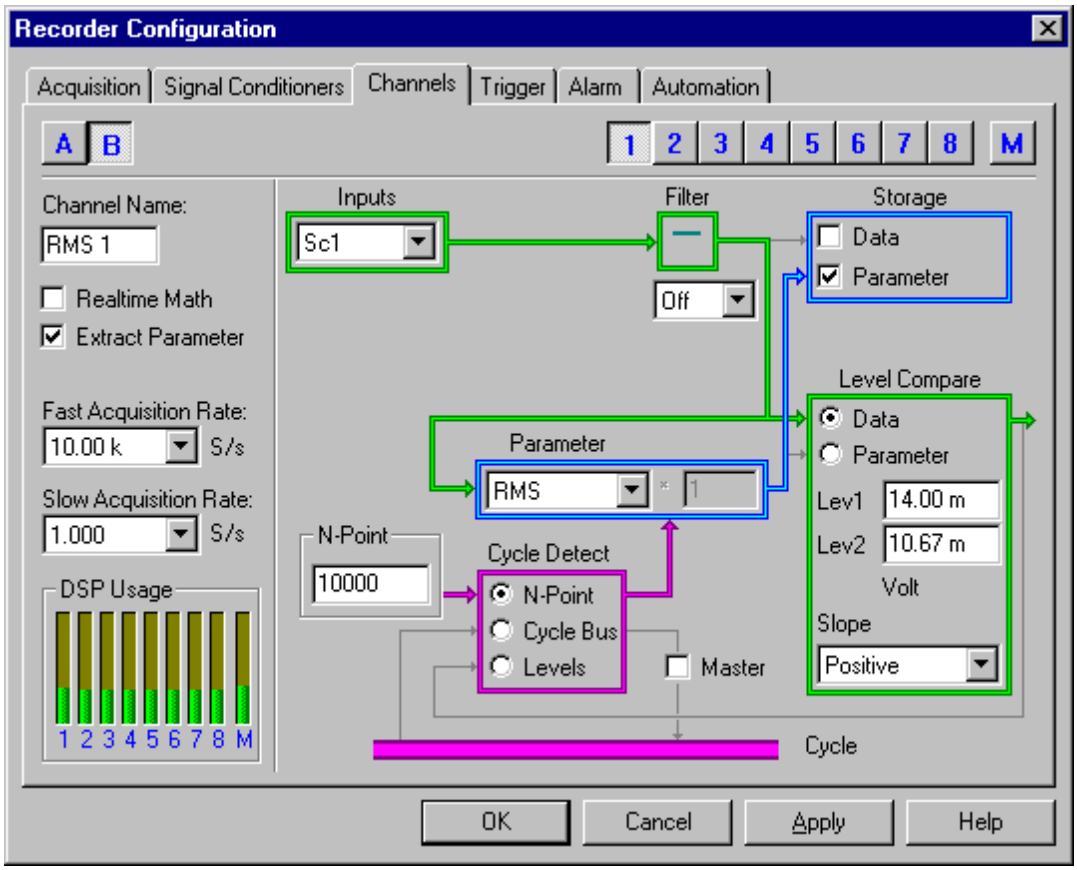
- **Pulse Width**: positive and negative crossings of the Level Compare are detected. The time from a positive crossing to a negative crossing is reported as the Pulse Width. Requirements:

  a.) At least one full period must be detected within 65,535 samples at the current acquisition rate.
  b.) The Level Compare must be set to a value that is crossed with each cycle.
  c.) Cycle Detect must be switched to Levels.

- **RMS**: the arithmetic Root-Mean-Square of all samples in the selected period. Each sample's value is squared and added to a running summation. At the end of each selected period, the summation is divided by the number of samples to determine its mean value. The square root of the mean is then computed as the RMS. For the highest accuracy on periodic waveforms, select Levels or Cycle Bus to compute the true RMS value of each cycle.
- **Slope**: the difference between the first and last point of the selected period is measured. Because the slope is in general a very small number, an additional control is provided to expand the result. Enter a multiplier here to make the Slope output large enough for viewing.



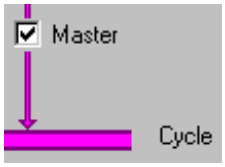
16. **Advanced Technique – N-Point Data Reduction**: In many applications such as combustion analysis or powerline monitoring, the detailed waveform data is not desired. Rather, a reduced data set comprised of only Maximum or RMS values, etc. over a period of time is much more useful. The Odyssey's N-point Parameter calculation and Dual Rate acquisition modes may be combined to allow powerful data reduction. Recall that the Parameters are always computed on the Fast data (up to 100 kS/s), with updates at the end of each N-point interval. If the Slow storage rate is simply set to match the Parameter update rate, a massive reduction in data volume is achieved. Consider the case of monitoring a 50 Hz powerline for surges or sags in RMS voltage. To include the highest harmonics, the user might select a relatively high acquisition rate of 10 kS/s. One hour of continuous recording would then produce a staggering 36 million samples! If instead the RMS value of 10,000 points is computed and stored once a second, only 3600 values are necessary to accurately summarize the hour. The Odyssey in this example will be set as shown below. Although the RMS of one second's data is shown, the technique is equally applicable to any Parameter calculation. No triggers are enabled in the Trigger tab: the Dual Rate is used for data reduction only to allow recording at the Slow (Parameter) rate.

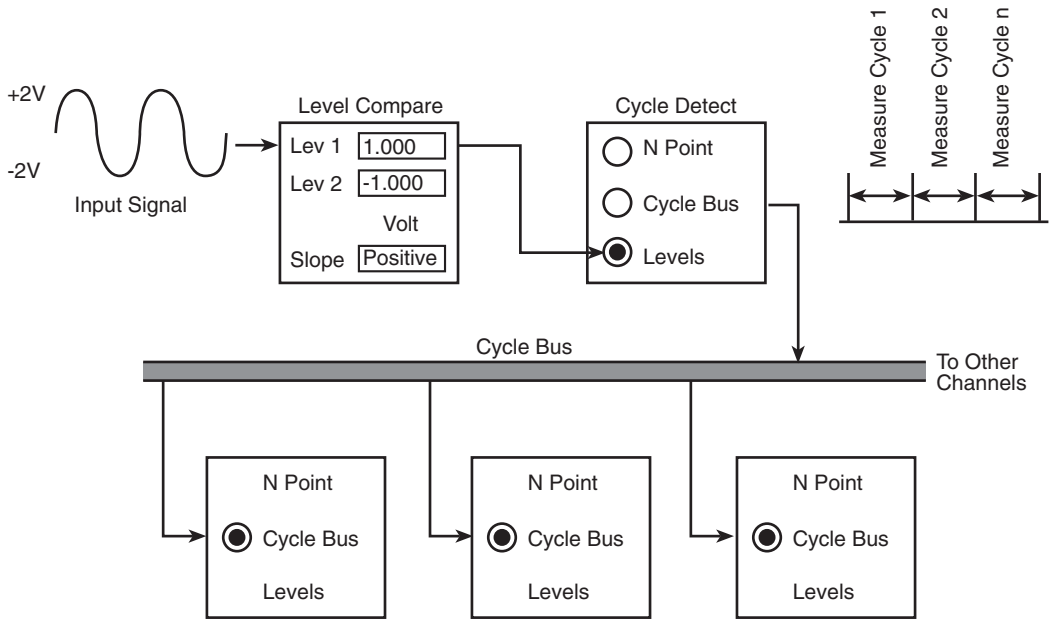


The key settings to achieve data reduction in this dialog are:

Fast Acquisition Rate of 10 kS/s:	High rate assures highest harmonics are accurately measured
RMS of N-Point 10,000:	Computes the RMS value every second
Storage of Parameter:	Stores the RMS Parameter rather than raw data
Slow Acquisition Rate of 1 S/s:	Stores the RMS once per second as each new computation is available

17. **Advanced Technique - Cycle Bus Measurements:** To broadcast this channel's measurement period to other channels, click **Master**. One channel must be configured as the **Master** to use the **Cycle Bus**. Other channels may then be set to "listen" to the Cycle Bus. Typically a clean signal is selected as master for reliable cycle detection, then the **Cycle Bus** causes all channels to make measurements exactly in synchronization. For example, the RMS of a 3-phase voltage and current can be measured accurately cycle-by-cycle, or the maximum combustion pressure in all cylinders of an automobile engine can be collected with every combustion cycle. An illustration of the Cycle Bus concept appears below.



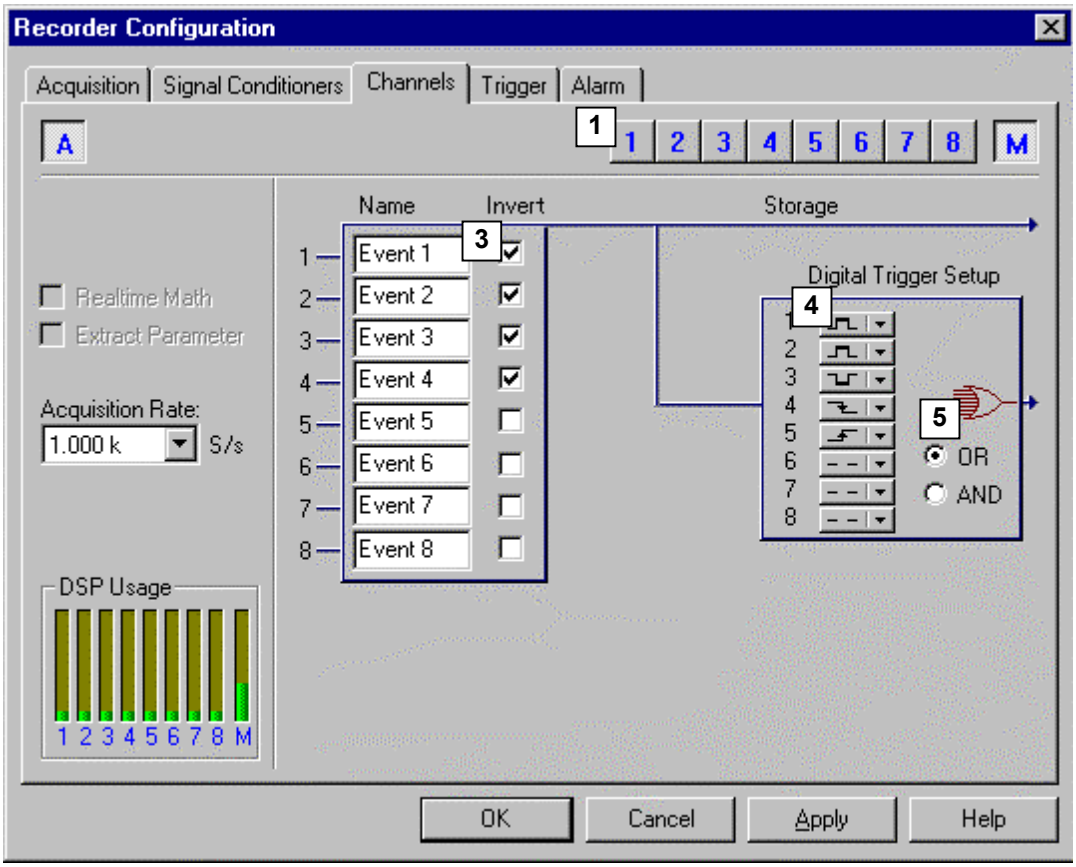


18. **Advanced Technique – Cycle Bus Storage**: In addition to synchronizing the calculations, Cycle Bus may also be used to clock the data storage for a uniquely powerful data reduction tool. To store only the Parameter values as they are updated, select Cycle Bus Storage in the *Configure… Acquisition* dialog earlier in this Chapter. For example, the peak combustion pressures in an engine could be collected in real-time for thousands of cycles, then statistically analyzed for the rate of misfires.

    Click **OK** at the bottom of the dialog to enter the configuration and exit the dialog, click **Cancel** to exit the dialog without making changes to the system configuration, click **Apply** to apply the changed configurations to the current recording, or click **Help** to receive help with the dialog. You can also click on another tab to set other configurations. To modify the display of the calculated Parameters, see the *Config…Parameters* section later in this Chapter.

Digital Marker Inputs

Each Odyssey acquisition card contains 8 TTL digital inputs which are always recorded. By default they are not displayed, but are available in the *Config…Display* dialog described later in this Chapter.

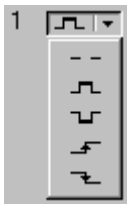


To configure the digital marker channels:

1. Select the digital markers button (**1**) for this acquisition board. Each acquisition board has 8 TTL-level digital inputs.

2. For each of the eight digital channels, you can enter a name which is used to identify each digital trace on the display (**3**). You can choose to invert each channel, so that a low voltage represents logical one.

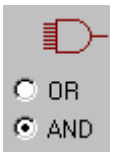
3. Any of the channels or their logical combinations may be used to generate a trigger. Configure the digital triggers (**4**) from the drop down menu for each channel. The digital inputs are sampled at the current acquisition rate. An input must last for at least one sample period to be recognized. A rising or falling transition means that an edge occurred since the previous sample and will be true for one sample period only.



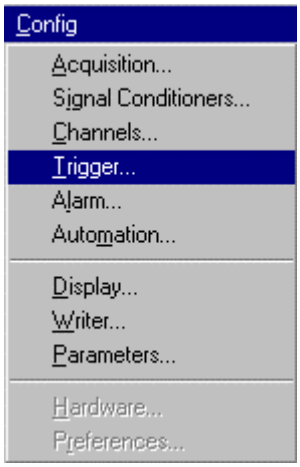
don't care
high
low
rising
falling

4. Select the logic for the digital trigger (**5**). A channel trigger event can be generated from the digital inputs. Select **OR** to generate a trigger when any of the input conditions are met. Select **AND** to generate a channel trigger when all of the input conditions are met. An AND condition must be true at the instant of sampling; there is no latching or sequencing. Therefore, rising or falling transitions should not be used in an AND condition.

or

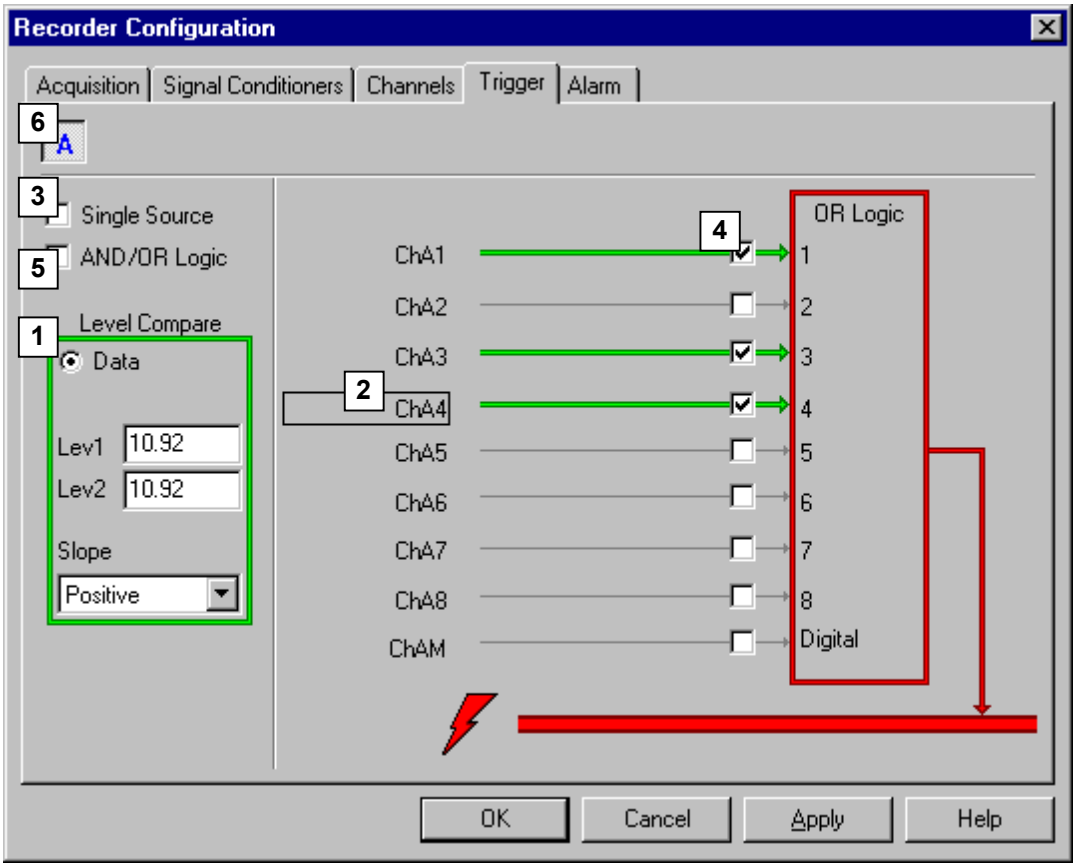


5. Click **OK** at the bottom of the **Recorder Configuration** dialog to enter the configuration and exit the dialog, click **Cancel** to exit the dialog without making changes to the system configuration, click **Apply** to apply the changed configurations to the current recording, or click **Help** to receive help with the **Recorder Configuration** dialog. You can also click on another tab to set other configurations.



Trigger

The ***Trigger*** command opens the **Trigger** tab of the **Recorder Configuration** dialog, which allows you to configure the trigger logic.



If this screen is gray, system triggering has not been enabled. Return to the Acquisition tab and click the **Enable Trigger Events** box.

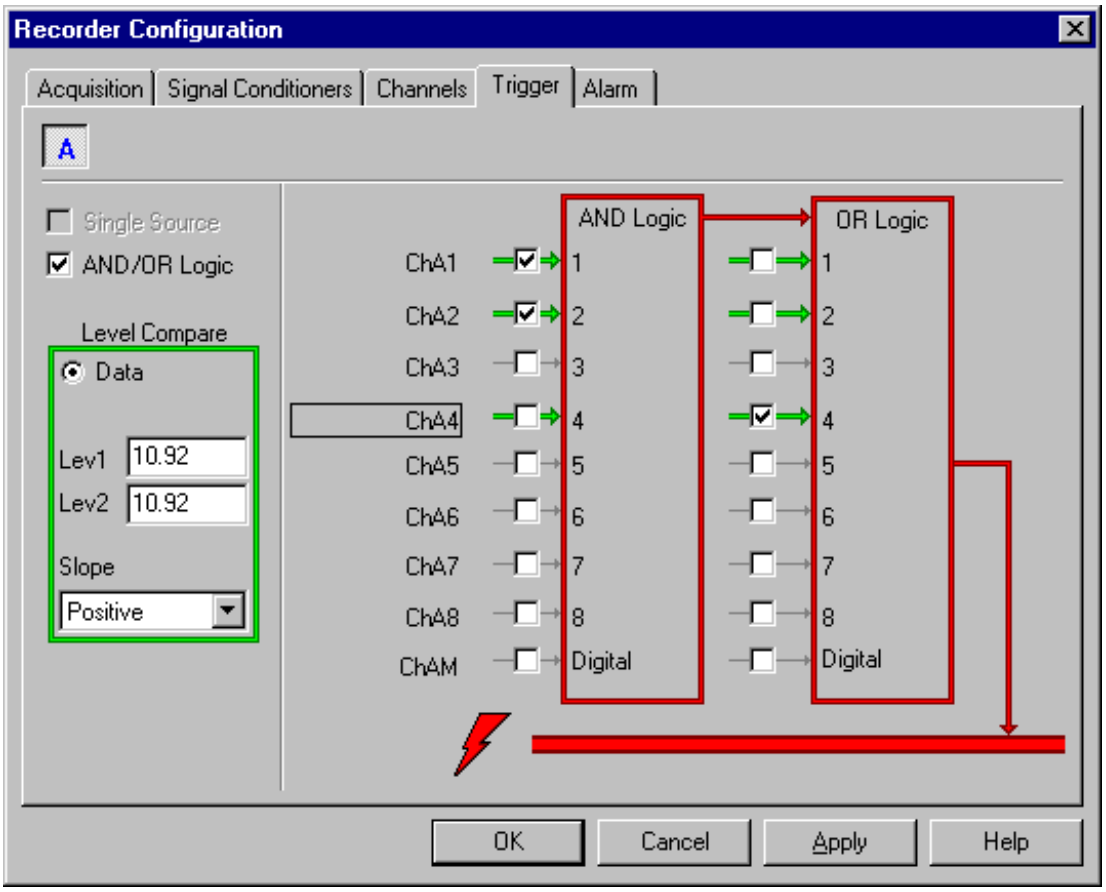
To configure the trigger:

Note: *The Level Compare area (**1**) is identical to the one in the Channels. The levels for the selected channel (**2**) appear here for your convenience. Changing a value in this area changes it in the Channels tab..*

1. Select a single source trigger by clicking on **Single Source** (**3**) and selecting a channel. Selecting Single Source automatically deselects other selections, allowing for a single trigger source only, like an oscilloscope. For a multiple source trigger, deselect **Single Source** and click on multiple channels to select them (**4**).

2. You can create any logical combination of the trigger events using AND/OR logic. Add AND logic by clicking on **AND/OR Logic** (**5**).

   The display changes to add AND logic.



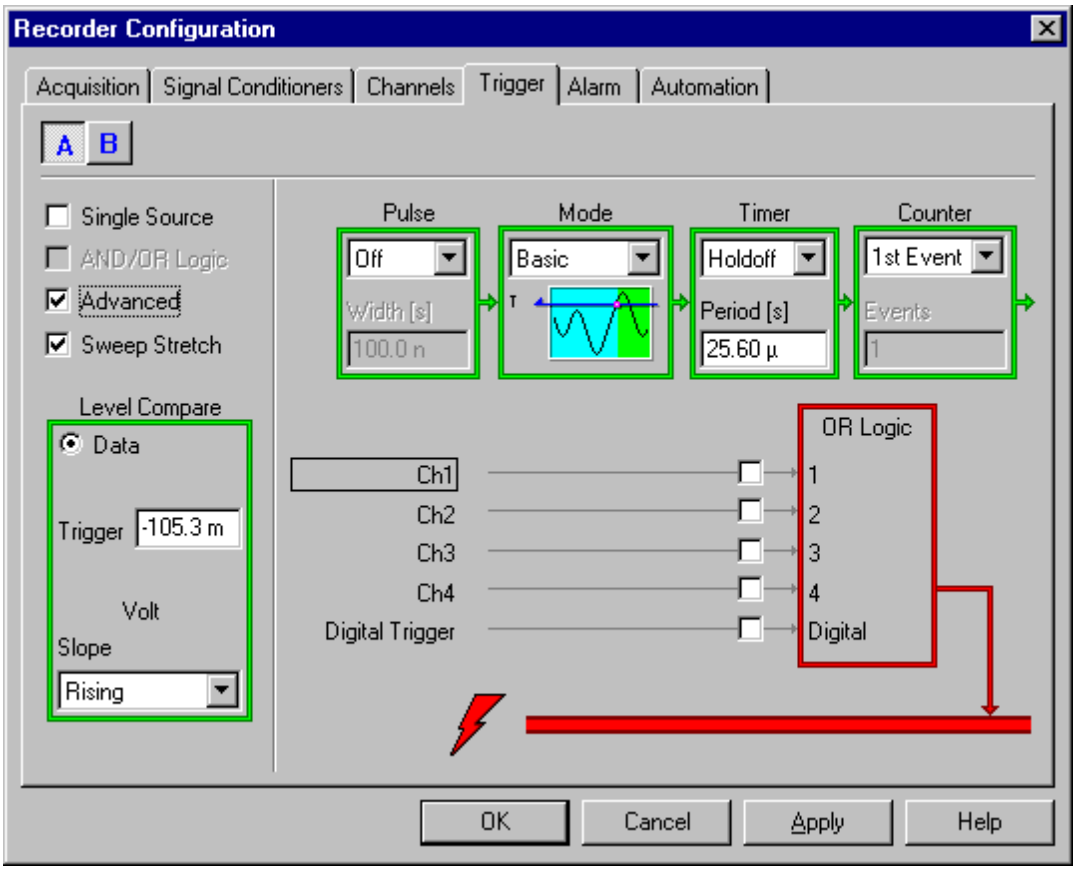
3. Select the required trigger events. If your system has more than one acquisition board installed, select boards B, C, D, if present (**6**) to set the trigger logic for other channels. All channels in the system participate in an OR condition. The AND logic applies only to the channels on one board.
   Note: The rear panel Trigger In BNC and front panel Trigger button are always active.

4. Click **OK** at the bottom of the dialog to enter the configuration and exit the dialog, click **Cancel** to exit the dialog without making changes to the system configuration, click **Apply** to apply the changed configurations to the current recording, or click **Help** to receive help with the dialog. You can also click on another tab to set other configurations.

OD-200 Advanced Trigger (OD-200 Only)

The high speed OD-200 acquisition board includes an array of sophisticated triggering features that permit the most elusive transient to be captured. Due to the high transient recording speed of up to 10 MS/s, these unique features are implemented by sophisticated hardware. They include Pulse Detect/Reject, Arm/Trigger Sequences, Holdoff, Dropout, Glitch, and Event Counting.

To use the Advanced Trigger features, click the Advanced Checkbox in the Trigger dialog. A variety of new options appear as shown here.



The Advanced functions under the Pulse, Mode, Timer, and Counter controls are independent of each other and may be combined for even more powerful trigger conditions. Two digital level comparators per channel may be used in a variety of configurations to qualify or disqualify trigger events. The output of each channel's Advanced Trigger circuitry is then applied to the OR condition that generates the system trigger. The two comparators always receive data at the full 10 MS/s rate of the digitizers, so a trigger event only 100 ns in duration can be captured at any acquisition rate.

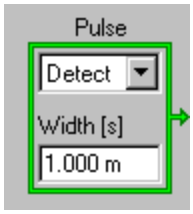
Pulse

The **Pulse** control allows you to set a minimum or maximum duration (Pulse Width) for which a Trigger must be true. The available controls are:

> **OFF**: No Pulse Detection is performed. All Trigger events are passed unaltered.
>
> **Detect**: Only Trigger events shorter than the Width you enter are passed. Longer duration events are ignored. This selection is useful for detecting brief glitches and abnormally short occurrences.
>
> **Reject**: Only Trigger events longer than the Width you enter are passed. Shorter duration events are ignored. This selection is useful for rejecting brief noise spikes.

The shortest Width that can be measured is 100 nanoseconds. The longest is 1.67 seconds.

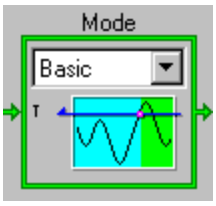
Technical Note: The Detect/Reject decision cannot be made until the specified time has expired, so the Trigger can become true only after the timing test is complete. If you are using a long Width such as 100 ms, be sure to include at least 100 ms additional Pre-trigger. This will assure that you capture the beginning of the Pulse.



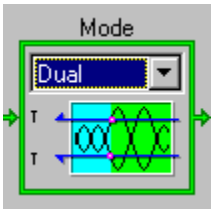
Mode

The Mode control provides several possible sequences of Arm and Trigger logic. Four selections are possible. The examples illustrate a Rising slope. You may also select a Falling slope to invert the action.

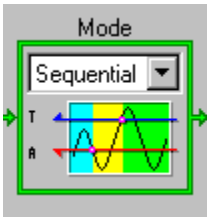
> **Basic**: A Trigger is accepted whenever the input passes above (Rising) or below (Falling) the single Trigger level. Only one level detector is used in the Basic mode, in similar fashion to a traditional analog oscilloscope trigger.



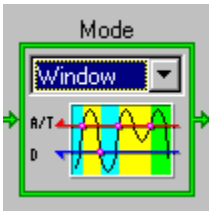
Dual: In Rising slope, a Trigger is accepted if the input crosses to the outside of either Trigger level. This condition is useful to detect a signal that becomes abnormally high or abnormally low. In Falling slope, a Trigger is accepted if the input crosses either Trigger level from the outside. This detects a signal that falls into the region of interest from either direction.



Sequential: Two independently-adjustable levels are used as an Arm and a Trigger, providing adjustable hysteresis for noise rejection. In Rising slope, the input must first fall below the Arm level and then rise above the Trigger level. In Falling slope, the input must rise above the Arm and then fall below the Trigger level. This mode is similar to the normal operation when Advanced Trigger is off, but is included here so you can combine its noise rejection properties with the other Advanced functions.



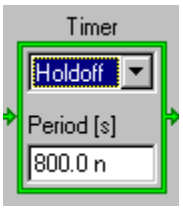
Window: Two independently-adjustable levels are used as an Arm/Trigger and a Disarm. In Rising slope, the Signal must first rise above the Arm/Trigger level, and then rise above it a second time without crossing Disarm to become a valid trigger. If the signal passes the Disarm level, the trigger is disabled until passing the Arm/Trigger level again. Falling slope simply reverses the crossing directions. The Disarm may be either higher or lower than the Arm/Trigger level. This mode is useful for detecting a failure to cross an expected level, for example a sub-cycle dropout on a powerline or a low-amplitude pulse.



Timer

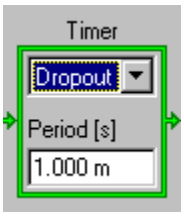
A counter-timer on each channel provides a selection of time-delay and frequency-sensitive trigger functions.

Holdoff: After each Trigger event, subsequent Triggers are blocked for a specified amount of time. This is useful for preventing spurious re-triggers on oscillatory or noisy waveforms. The minimum Holdoff is a negligible 800 nanoseconds. The maximum value is 140 seconds.



Within: The timer allows triggers only if consecutive events occur <u>within</u> the specified time period. This function is somewhat similar to the Pulse Detect/Reject discussed earlier but operates on the time between successive events, rather than the pulse width of a single event.

Dropout: The timer generates a trigger if the specified time period passes <u>without</u> a Trigger input being detected. This mode is useful for detecting a frequency that is too low, or a complete dropout of the signal. It is normally used with a substantial amount of pre-trigger to capture events leading up to the dropout. Especially when used with the OD-200 Continuous Recording mode (described in the prior *Config…Acquisition* section), it is a powerful tool for diagnosing intermittent failures.



Counter

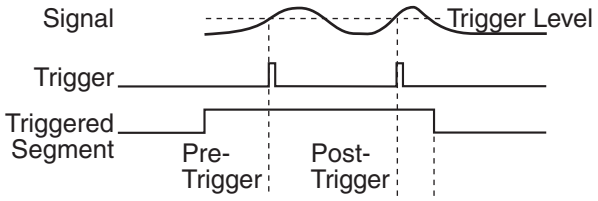
In the default selection of "**1st Event**", the first occurrence of a valid Trigger is recognized. The event Counter may be used to delay the trigger recognition by a number of occurrences from 2 to 256. If the Counter is set to 5, the first four events are ignored and a trigger is generated upon the fifth event. This mode is useful if your events occur in bursts and you wish to capture the later events without consuming memory for the early ones. Examples include sonar or ultrasound tests, where the initial "ping" can be excluded while capturing all the echoes.

Sweep Stretch

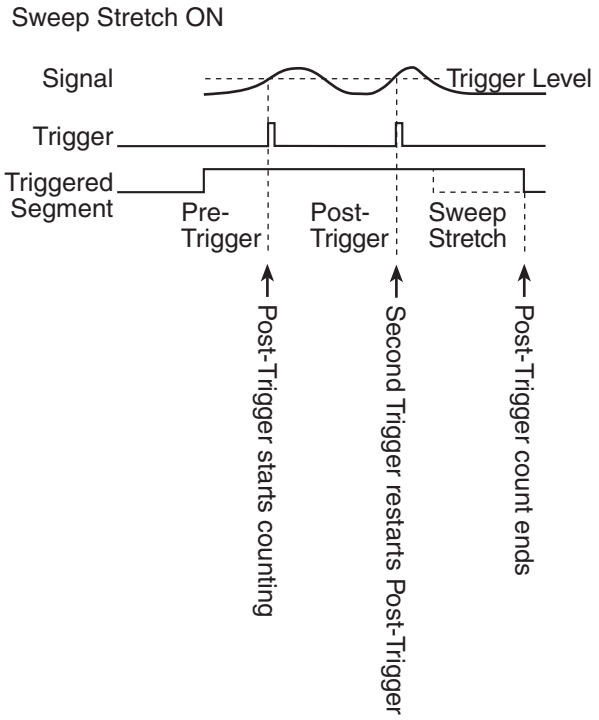
This checkbox, available only when Advanced Trigger is enabled, controls the OD-200's unique Sweep Stretch feature. It changes the board's response to triggers received during the Post-trigger time.

OFF (Unchecked): The OD-200 operates as a conventional transient recorder or oscilloscope. Upon each Trigger event, it acquires the selected amount of Pre-trigger and Post-trigger samples at the Fast Acquisition Rate. It then returns to the Slow Rate. A fixed number of samples are acquired for each Trigger, so all Triggered Segments are the same length. Any additional triggers that occur during the Post-trigger time are ignored.

Sweep Stretch OFF



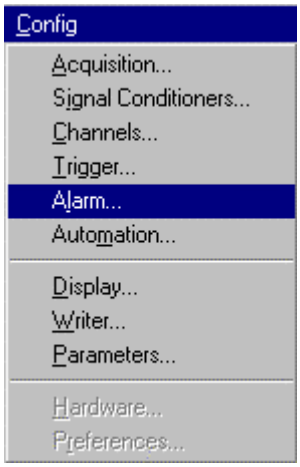
ON (Checked): Upon each Trigger, Pre-trigger and Post-trigger samples are collected at the Fast Acquisition Rate as above. But additional triggers detected during the Post-trigger time are accepted and restart the Post-trigger count. The High Rate segment is correspondingly "stretched" to include the new trigger(s) and additional Post-Trigger time. Whenever the Post-trigger count is reached without encountering new triggers, the board returns to the Slow Rate. Therefore there is no predetermined limit on the length of a Triggered Segment, and each segment may be a different length depending on the number of Triggers.



OD-200/OD-100 Trigger Compatibility

The high speed OD-200 acquisition board is designed to be compatible with the medium speed OD-100 board to the maximum extent possible. Any combination of acquisition boards may be freely mixed in an Odyssey mainframe. In all basic recording applications, the system behavior is identical between the boards. However, there is one exception necessary due to the difference in speed of 100 times. It is presented here for the information of the advanced user.

In the Advanced Trigger modes described above, the OD-200 presents a very short Trigger pulse to the Odyssey backplane to assure that even the highest speed triggers are captured. The OD-200 can accept triggers at a repetition rate of up to 1 MHz, much faster than the OD-100 card can recognize. The consequence of this high speed is that, in Advanced Trigger Modes only, any OD-100 boards in the system will not recognize the triggers from an OD-200. While all OD-200 cards in the system will respond to the fast trigger, the OD-100 boards will continue to record at the selected Slow Acquisition Rate. Therefore if you are using the Advanced Trigger modes, we recommend you use the OD-100 cards to record less dynamic signals that are to be recorded at a single acquisition rate.



Alarm

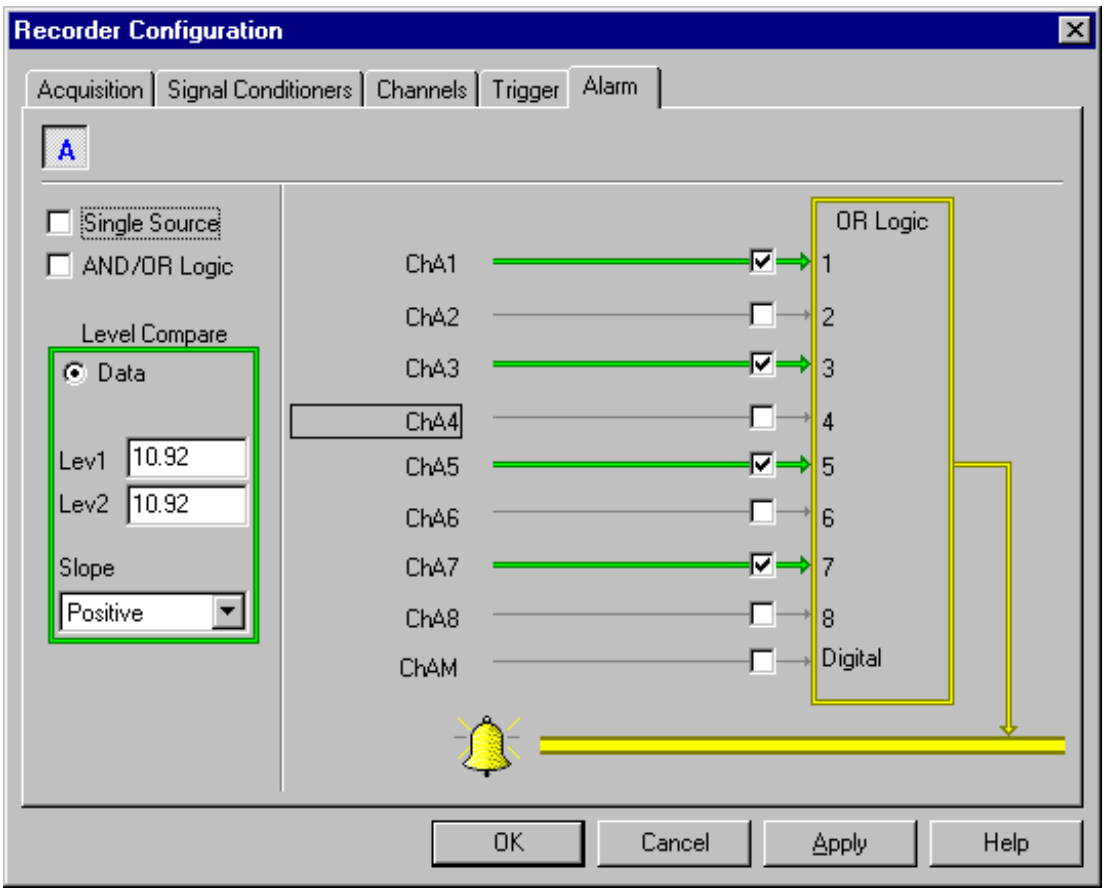
The ***Alarm*** command opens the **Alarm** tab of the **Recorder Configuration** dialog, which allows you to configure the alarm. The **Alarm** dialog is identical to the **Trigger** dialog, but is used to activate relay contacts for an external alarm signal. The Alarm relay output is on the rear panel Marker 1-6/Remote Connector.

Pin 38: Normally closed contact

Pin 39: Common contact

Pin 40: Normally open contact

The relay contacts are rated at 250V, 1A. The relay is energized during the time the Alarm condition is true and deactivated when the condition becomes false. On later systems, the relay is activated by a one-shot oscillator for approximately 150 msec to assure even the shortest alarm pulse is recognized.

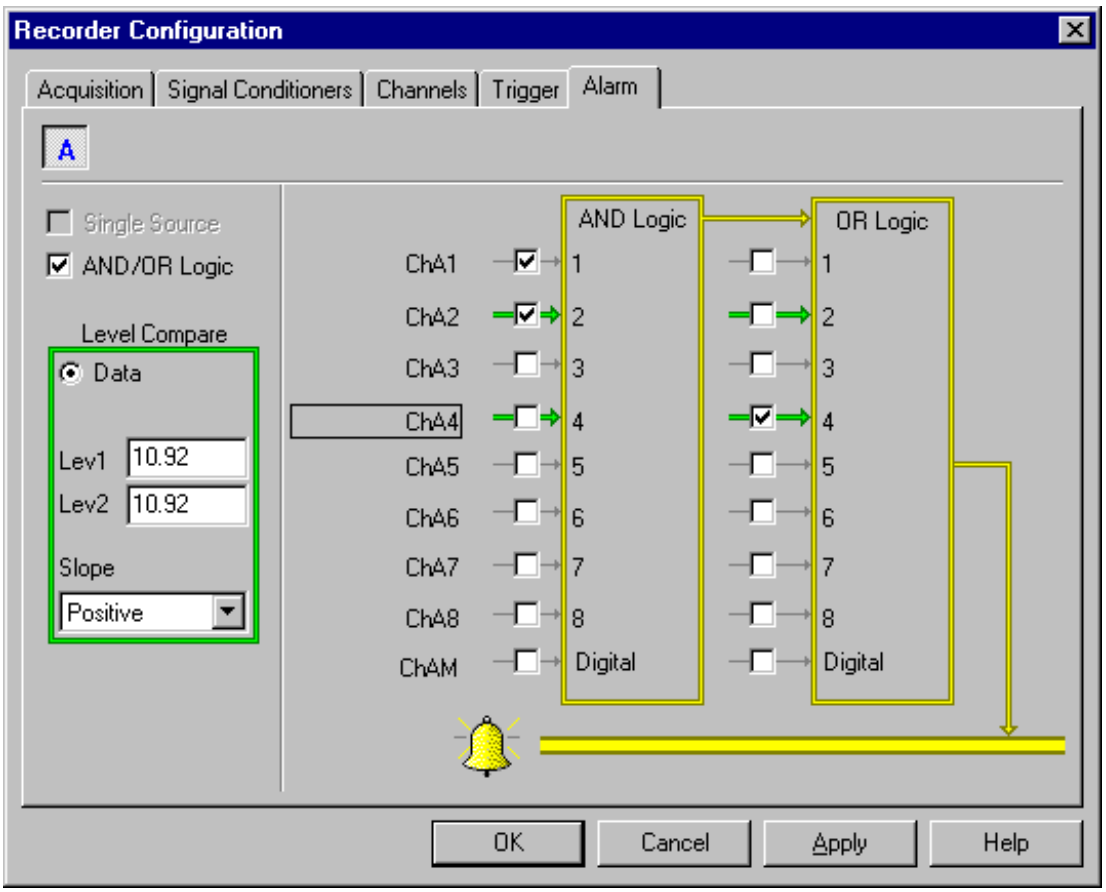


To configure the alarm:

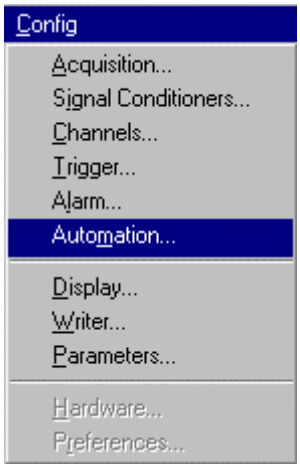
Note: *The Level Compare area is identical to the one in the Channels tab (**1**). The levels for the selected channel (**2**) appear here for your convenience. Changing a value in this area changes it in the Channels tab.*

1. Select a single source alarm by clicking on Single Source (**3**). For a multiple source alarm, click on the required channels to select them (**4**).
2. You can create any logical combination of the alarm events using AND/OR logic. Add AND logic by clicking on **AND/OR Logic** (**5**).

   The display changes to add AND logic.



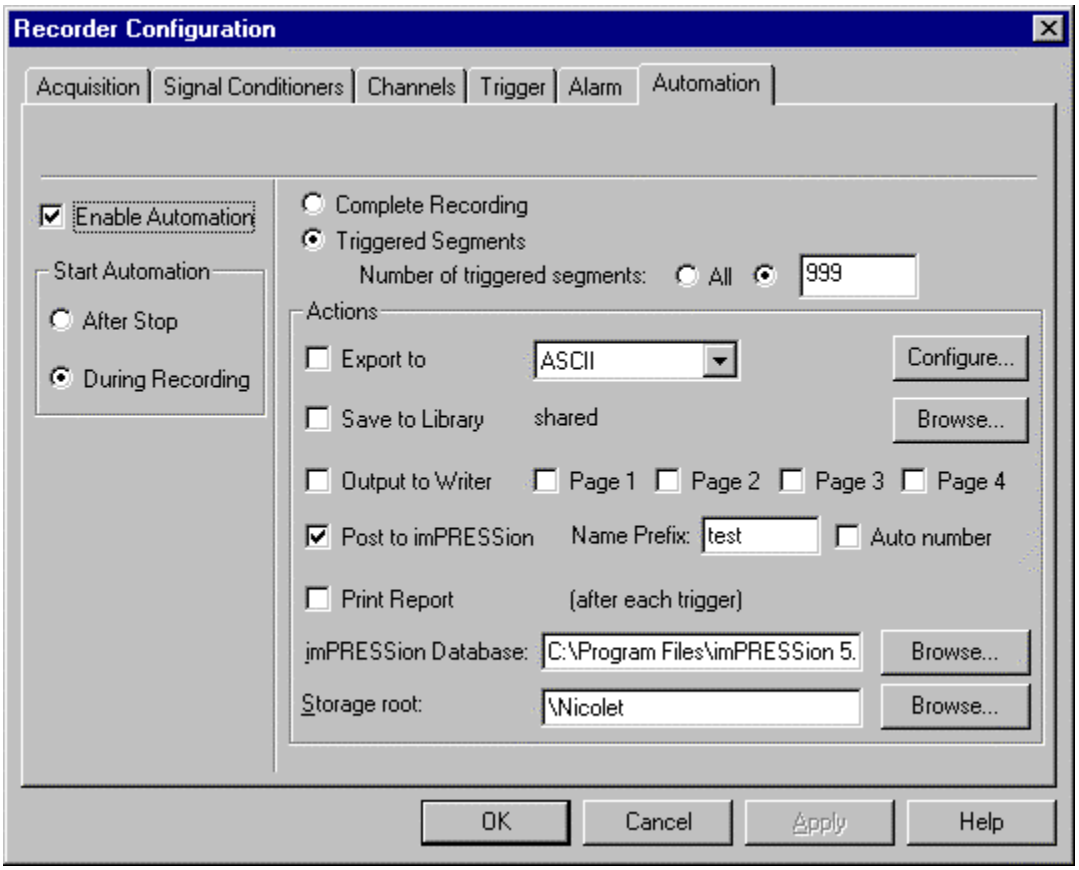
3. Select the required alarm events. All channels in the system participate in an OR condition. The AND logic applies only to the channels on one board.
4. Click **OK** at the bottom of the dialog to enter the configuration and exit the dialog, click **Cancel** to exit the dialog without making changes to the system configuration, click **Apply** to apply the changed configurations to the current recording, or click **Help** to receive help with the dialog. You can also click on another tab to set other configurations.



Automation

The ***Automation*** command opens the **Automation** tab of the **Recorder Configuration** dialog. This powerful and convenient feature allows you to choose from an array of actions to be automatically performed after each recording or each trigger. With a few clicks, you can set the Odyssey to:

- Automatically capture each trigger for analysis in ProView or imPRESSion software, without interrupting recording and monitoring,
- Automatically copy each recording to a file server on your network,
- Automatically plot each Trigger event during a long recording, or
- Automatically export each Recording or each Trigger in any of more than a dozen formats.



To configure the system for an automation action:

1. Select the part of the recording to analyze. You can choose to analyze:

   - **Complete Recording**: Post, store or plot the entire length of each recording. A new file or plot will be generated for each recording. Each one contains all data from all channels.
     Note: Since the Odyssey can make huge recordings of thousands of Megabytes, use this option with care if you have a long-duration recording at high sample rates! Most versions of Windows are limited to a 2GB file size. Copying large recordings may consume many minutes or hours, depending on the speed of your storage device.
   - **Triggered Segments**: Post, store or plot only the triggered segments within each recording. Each triggered segment will be processed individually, including the pre-trigger and post-trigger data. An individual file or plot will be generated for each triggered segment. Data recorded between triggers will be ignored by the automated actions, saving storage space and time. To use the Triggered Segments option, each recording must contain at least one triggered segment.
     In the **Number of triggered segments**, you may select **All** to act on every trigger in the recording, or enter a number to act on the first "n" number of triggers only. If you are processing ten recordings and you select five triggers, the result will be 50 files or plots.
     Note: A **Triggered Segment** contains pre- and post-trigger data and may be of any length. It includes the number of pre-trigger samples you specify, all samples recorded for as long as the trigger condition is true, and the specified number of post-trigger samples after the trigger condition goes false. If another trigger signal was detected before the post-trigger time elapses, the segment also contains the additional triggered data and additional post-trigger data.

2. Select the desired automated **Actions** to perform on each new recording.

   You can select any or all of the options for automatic actions.

   - **Export to**: Export data for use with other analysis programs such as SpectraPro, MATLAB or DADiSP. Select the type of export format from the pull-down menu. Each Recording or segment will generate a new file. (Some export formats allow only a single channel per file, and generate up to 32 files for each recording or segment.) Click on the **Configure** button to select the appropriate options for each export type such as file names and directories.

   - **Save to Library**: Save the recording or segments to a **Library Shelf** which can be a Wndows directory anywhere on your PC or network. Click the **Browse…** button to select from existing **Shelves**. To create a new shelf, use the **New Shelf** command in the Odyssey ***Recording Manager*** (see the *Recording Manager* section in Chapter 11).

   - **Output to Writer**: Click this button to automatically plot the recording or segments to the currently selected stripchart writer. Click on the checkboxes for Pages 1-4 to indicate which display pages to print. To select printers, change writing speed, etc., refer to the ***Configure…Writer*** dialog (see the *Writer* section in this chapter.)

- **Post to ProView**: This option is not available if ProView is not installed on your Odyssey. Post data from the recording or segment to the (optional) ProView analysis software. The recording name, length, sample rate, and other information is also provided to ProView. If desired, enter a **Name Prefix** of up to six characters to identify different data sets in ProView. Similar to a spreadsheet template, ProView recalculates its formulas each time new data is posted. Also similar to a spreadsheet, the ProView views, analysis formulas, and Report template must be set up in advance of the automated posting.

  If the **Auto number** checkbox is off, each posting will overwrite the previous one, so the last one processed is always available for quick inspection. Waveforms carry the same name with each posting, so each formula you define is recomputed with the new data. This option must be selected to allow automated analysis of different segments.

  If you click the **Auto number** checkbox, each new data set is added to the ProView Data Pool with a unique name. You can then define additional views and analyses of the various data sets. Note that since each new data set is assigned a unique incrementing name, your predefined formulas will not act on the new data..

- **Post to imPRESSion:** If you have selected imPRESSion as your post-processing software, the dialog will include this option rather than the Post to ProView. Operation is similar in nature to ProView, but additional fields are provided to specify the imPRESSion database and folder to use. This may be on your local PC or anywhere on your network. ImPRESSion software need not be installed on your Odyssey.

- **Print Report**: Analyze the waveforms and print a report after posting. This lets you produce fully annotated reports from each recording or triggered segment with a template you define, a great convenience for repetitive testing, such as Quality Assurance, Manufacturing, and Failure Analysis applications. This option is available only when **Post to ProView** or **imPRESSion** is selected. The Report template must also be defined in advance of using the Automation, and the auto numbering feature must be off.

3. Click the **Enable Automation** checkbox to enable the Automation features. Each new recording or triggered segment will then perform all the actions you selected above. Click the checkbox again to turn off the automation. Your settings are retained for the next time you wish to use Automation.
   Note: To avoid confusion and possible unwanted lengthy operations, Enable Automation is turned off each time Odyssey starts.

4. Select the **Start Automation** features:

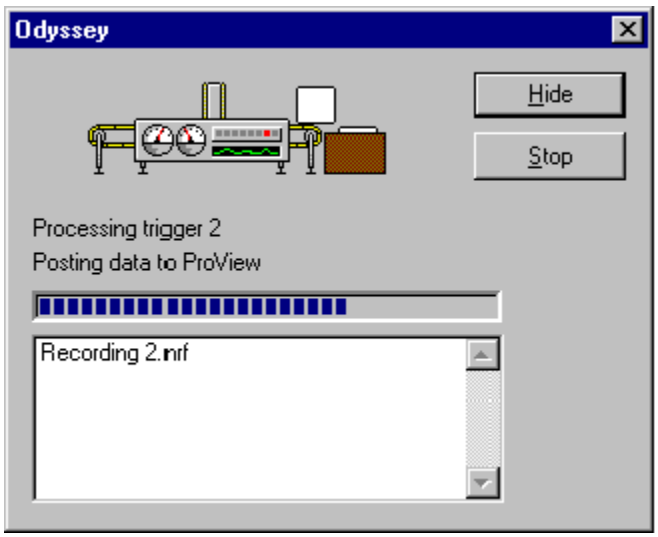
   - Click the **After Stop** button to begin Automation immediately after the recording stops. The posting or storage of data begins when you press Stop or after your specified recording duration. This mode is useful for plotting rapidly occurring events or the entire recording after completion.

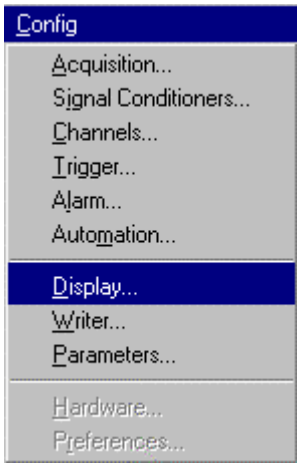
- Click the **During Recording** button to begin the Automation while the recording is still in process. This mode is useful for plotting or storing infrequent trigger events, so that the most recent events are easily available for inspection. The **During Recording** option operates only with acquisition speeds of 10 kS/s or less with the OD-100 card or 100 kS/s with the OD-200 card.

5. Click **OK** at the bottom of the dialog to enter the configuration and exit the dialog, click **Cancel** to exit the dialog without making changes to the system configuration, click **Apply** to apply the changed configurations to the current recording, or click **Help** to receive help with the dialog. You can also click on another tab to set other configurations.

The Automation actions you selected begin with the next recording you make. To automate operations on the current or previous recordings, refer to the **Post-Processing** feature in the **Toolbar** (see the *Post Processing* section in Chapter 13) or the Odyssey **Recording Manager** (see the *Recording Manager* section in Chapter 11).

While the Automation actions are taking place, you will see a message box informing you of the status. The multi-tasking Windows environment lets the automation take place while other tasks continue. You can hide the status box by clicking the **Hide** button, or Stop the Automation in process by clicking Stop. To view the status box again after hiding it, click the **Automation Status** button on the right side of the Odyssey **Toolbar**.

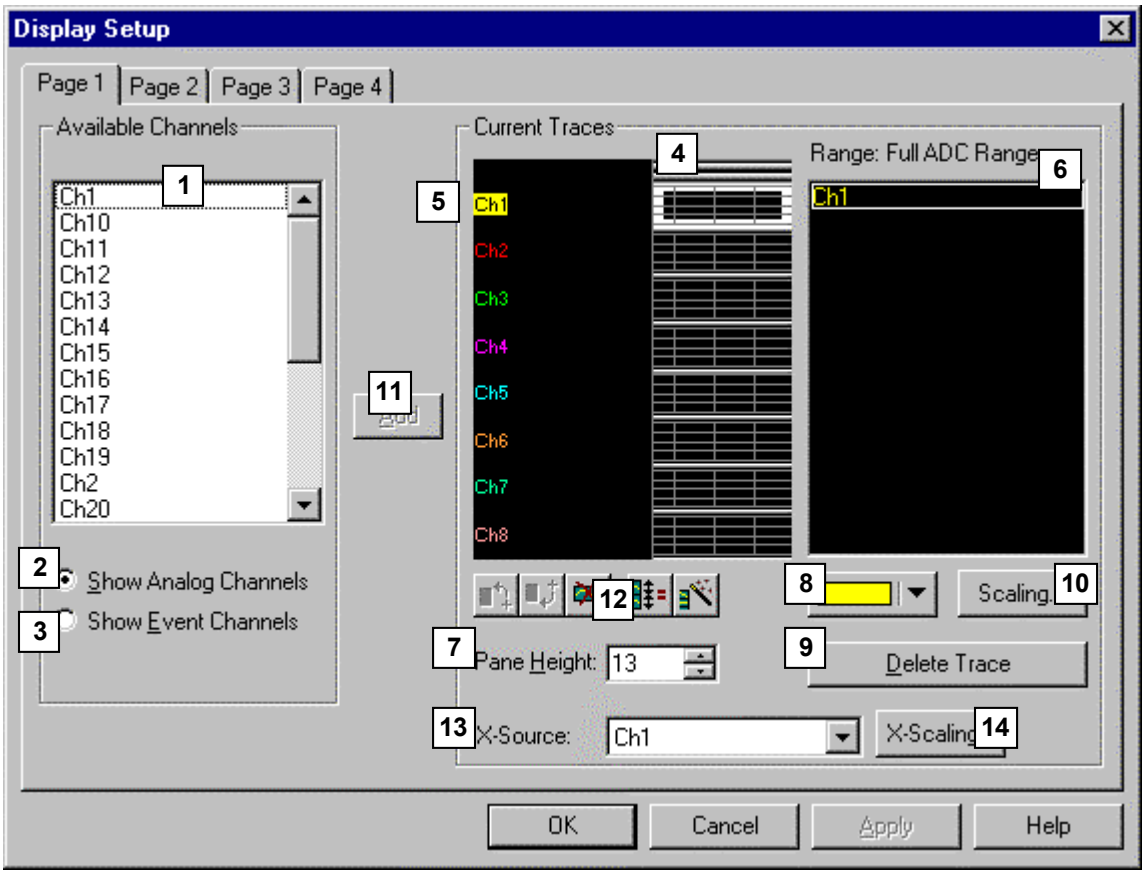




Display

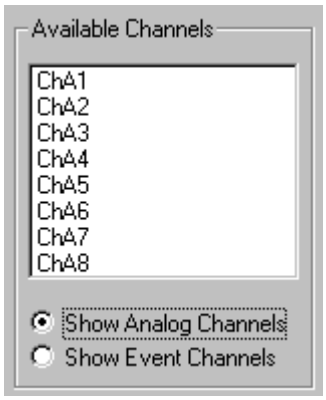
The ***Display*** command opens a dialog that allows you to select the number of panes and the channels to display in each pane in the **Recorder Display**. You can configure each of the four pages separately.

 This menu command has the same effect as the **Configure Display** tool command in the **Toolbar**.



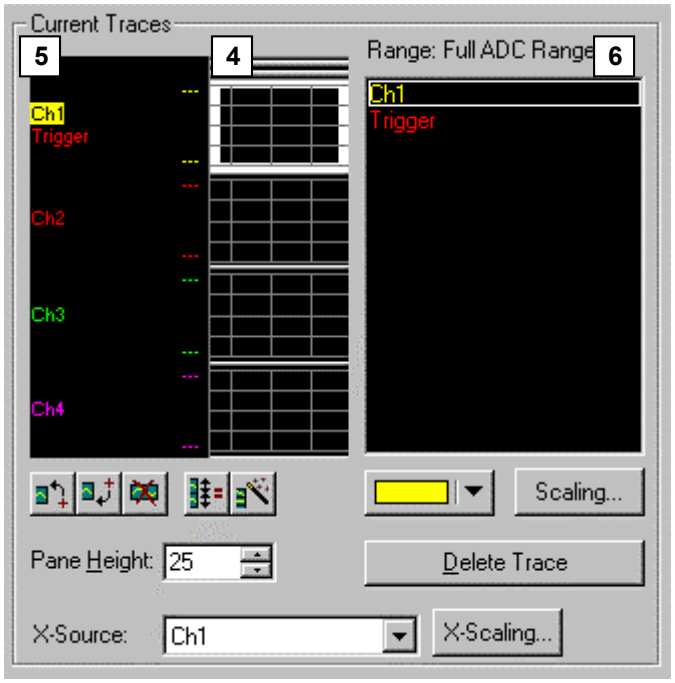
Each page of the **Recorder Display** can be configured separately in the **Configure Display Pages** dialog by clicking on the tab corresponding to the page you want to configure.

The **Available Channels** area (**1**) lists either the Analog (**2**) or Event (**3**) channels, depending on your selection. Clicking on a channel name selects it.

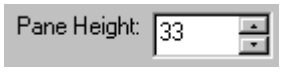


or

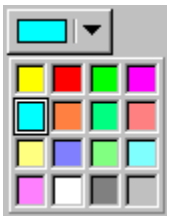
The **Current Traces** area (**4**) shows the current display setup on the left. Horizontal lines divide the panes. You can select a pane by clicking on it. A highlighted box appears around the channel name and the pane to indicate the one you selected (**5**). The box on the right displays the channel traces that will appear in the selected pane (**6**).



You can change the height of each individual pane with the **Pane Height** (**7**) control. This feature allows you to see a more detailed view of the main data while still keeping comparison data available. The pane height is shown as a percentage of the total height of the display. Change the pane height by selecting a pane and, using the up and down arrows, enlarge or reduce the pane height.



You can change the color of each trace in a pane by clicking on the channel name in the right hand box (**6**) and then clicking on the color selector (**8**). Each new trace you add is assigned a unique color. If you prefer to change the color selection, select a new color from the drop down menu. The trace changes to the new color.



To delete a channel from a pane, select the channel to delete and click the **Delete** button (**9**). To delete the entire pane, see the **Pane Delete** command described below.

The **Scaling** button (**10**) allows you to set the display to any desired vertical range. Normally full screen on the display is equal to the amplifier input range. **Trace Scaling** allows you to expand a smaller range of interest for viewing, without affecting the recorded data. This ability is often called "Digital Zero Suppression." It allows two important advantages:

1. You can easily observe the smallest change on a steady or quasi-static signal, such as slow temperature changes or the millivolts of ripple on a DC power supply.
2. The display can be set to indicate a precise desired range, such as ± 100 microstrains, while retaining the full dynamic range of the digitizer to capture unexpectedly large disturbances or transients without saturation.

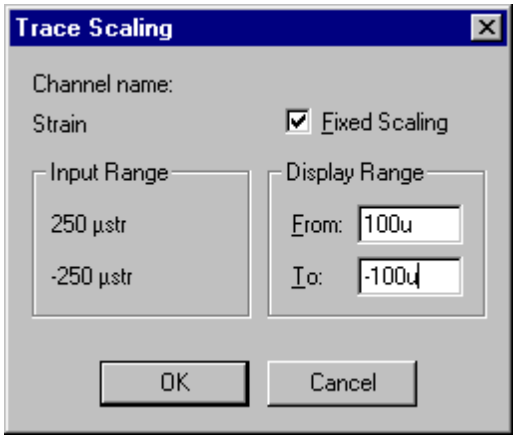
The **Trace Scaling** dialog indicates the name of the selected channel and the current Input Range in technical units.

To expand the display to show a subset of the full ADC range:

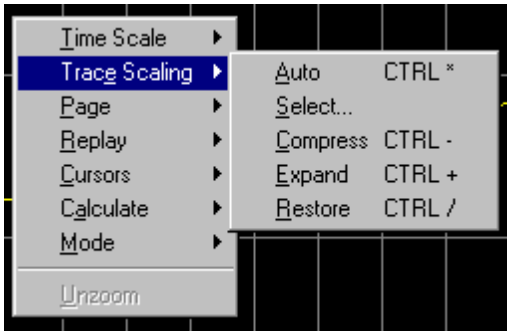
1. Click the **Fixed Scaling** checkbox.
2. In the upper box, enter the desired value for the top of the display. You may include "k" for thousands, "m" for milli-, "u" for micro-, etc.
3. In the lower box, enter the desired value for the bottom of the display.
4. Click **OK** to accept the settings and return to the **Configure Display Pages** dialog.

To restore the display to the full ADC input range:

1. Click the **Fixed Scaling** checkbox a second time to remove the check mark.
2. Click **OK** to accept the settings and return to the **Configure Display Pages** dialog.



For your convenience, the Trace Scaling functions are also available by clicking the right mouse button in the Recorder Display. One-touch keyboard shortcuts are also provided.



To add a channel to a pane:

1. Select a channel to add in the **Available Channels** area (**1**).
2. Select the pane to which you want to add the channel in the **Current Traces** area (**5**).
3. Click the **Add** button (**11**). The channel name now appears in the list of channels for the pane and a new trace appears in the pane. Notice that the color of the channel name and trace correspond.

A single pane may contain up to eight traces.

Note: *You can quickly add a channel to a pane by double clicking on the channel name in the list of channels.*

The toolbar (**12**) in the **Configure Display Pages** dialog contains tools that allow you to quickly access a number of display commands.

The **Insert Above** tool inserts a pane directly above the currently selected pane (the one with the arrow beside it).

The **Insert Below** tool inserts a pane directly below the currently selected pane (the one with the arrow beside it).

The **Delete Pane** tool deletes the currently selected pane (the one with the arrow beside it). The keyboard Delete key has the same effect.

The **Equal Height** tool resets the height of all the displayed panes and makes them all equal.

The **Default Setup** tool resets the **Recorder Display** setup to contain eight panes (for OD-100 card) or four panes (for OD-200 card) with one trace per pane.

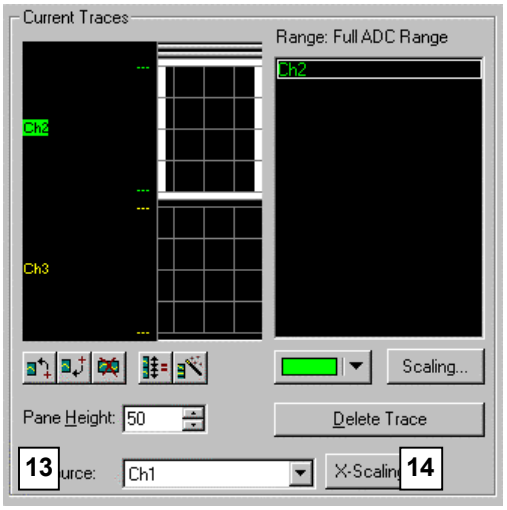
The **Add Display Page** tool creates a new blank display page in addition to the default Pages 1-4. Any number of pages may be added.

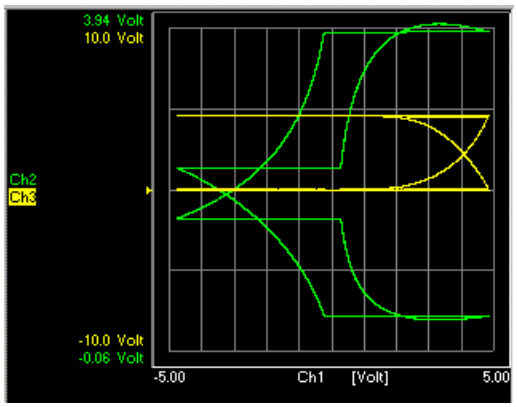
If you have five or more pages, the **Delete Display Page** tool deletes the currently selected display page. The minimum number of pages is four.

To compose an X/Y display:

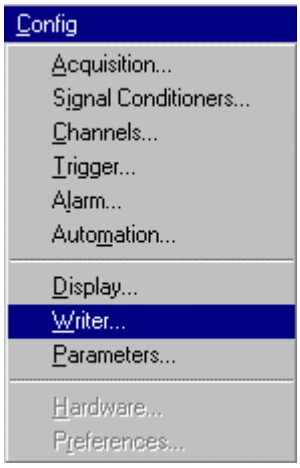
1. Use the **X-Source** control (**13**) to select the signal to be used for the X-axis. The pulldown list includes all channels in the system and any one may be selected for the X-axis.
2. By default the range of the X-axis will be the full scale of the selected X-Source. You may use the **X-Scaling** (**14**) button to set the X-axis to a larger or smaller scale. The dialog is the same as the **Trace Scaling** described on the previous page.

3. All channels you placed in the Current Traces area will be included in the X/Y display.





4. After leaving the **Configure Display Pages** dialog, enable the X/Y display by choosing **X/Y Display** in the ***Display…Mode*** menu. Refer to Chapter 10 *Display…Mode…X/Y* for more information on using the X/Y display.

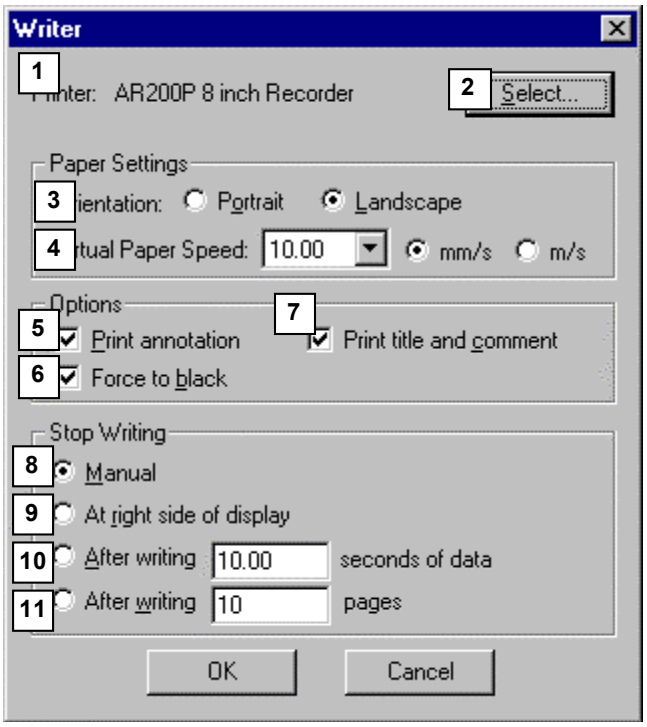


Writer

The ***Writer*** command allows you to configure the stripchart output for multi-page printing. (To print the current screen only, use the command ***File…Print Display***.) The optional Nicolet AR200P stripchart writer provides continuous paper output. However, any Windows printer may be used to make back-to-back single-sheet plots.

Some ink-jet printers allow use of continuous-feed banner paper. These may be used to produce stripchart output in black or in full color, but may have small discontinuities at the page boundaries. For the best results and gap-free output, Nicolet recommends our AR200P writer.

The **Writer Configuration** dialog appears as shown below.



In the upper left corner of the **Writer** dialog, the currently selected printer is displayed (**1**). To choose a different printer, click the **Select** button (**2**). All the printers currently installed are available through the Select button. For continuous stripchart output, the AR200P writer or other continuous-feed printer is required. Any Windows printers may be used to produce consecutive back-to-back pages.

The **Orientation** (**3**) selection allows you to decide whether to print a portrait or landscape output. **Portrait** prints waveforms in the tall orientation to get the greatest vertical detail. **Landscape** prints in the wide orientation to get the greatest amount of time on a page. You must use only the **Landscape** setting for the AR200P stripchart writer.

Virtual Paper Speed (**4**) selects how much information to include on each page. A slow speed condenses time information on the paper for a longer-duration overview of your recording. For example, a speed of 1 mm/s is equivalent to 10 seconds/cm, or about 5 minutes of data per page. A fast speed expands time to show greater detail of your signals. For example, a speed of 10 m/s is equivalent to 1 millisecond/cm, faster than a light-beam oscillograph. The printer produces pages at its fastest speed at any virtual speed setting.

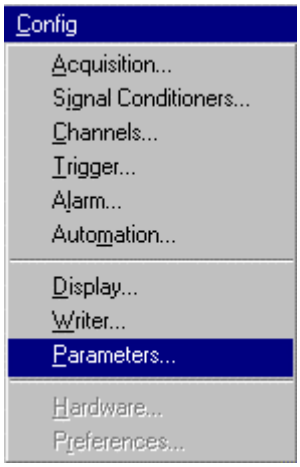
Print annotation (**5**) causes a time scale and channel names to be printed continuously. **Print Title and Comment** (**6**) causes the Recording title and comments to be printed on the first page. **Force to Black** (**7**) should be checked for monochrome printers, or unchecked to allow full-color printing on color printers.

The Writer output always starts from the left edge of the screen. You can select several different conditions for stopping. **Manual** (**8**) writes continuously until the end of the recording or until you press the Writer button again to stop it. **At right side of display** (**9**) writes for the duration of the current screen only. You may compose the screen's time span by changing the Expand/Compress Time Scale controls.

After writing n seconds of data (**10**) stops writing after the number of seconds indicated. **After writing n pages** (**11**) stops after writing the number of pages indicated.

Click the **OK** button when finished making settings. Your printer is now ready. To begin printing, press the front panel **Writer** button, or select the menu command ***Control…Start Writer***.

To learn how to install the Nicolet AR200P Stripchart Writer, refer to Appendix C. To install other Windows printers, refer to Appendix A.



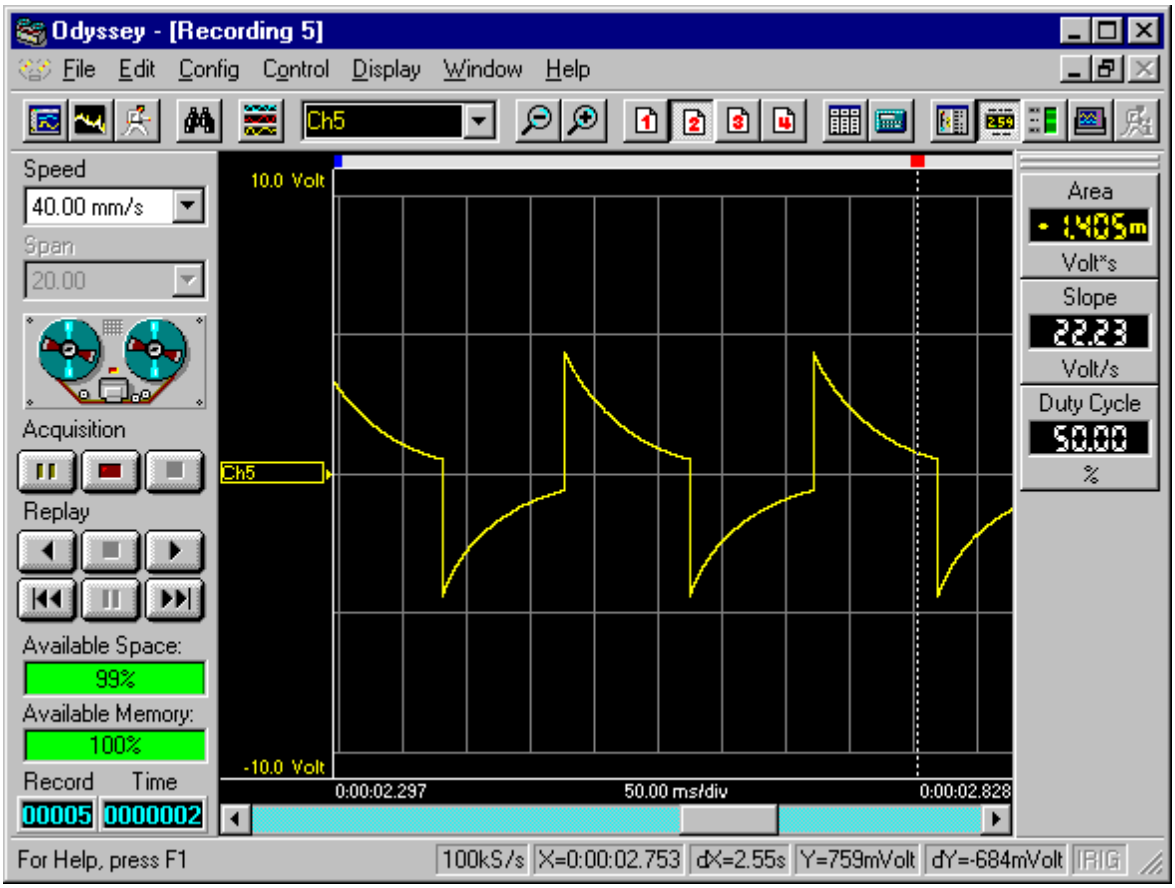
Parameters (OD-100 Only)

The OD-100 acquisition card can compute real-time measurements.

The ***Parameters*** command opens a dialog that allows you to select and modify which calculated parameters to display.

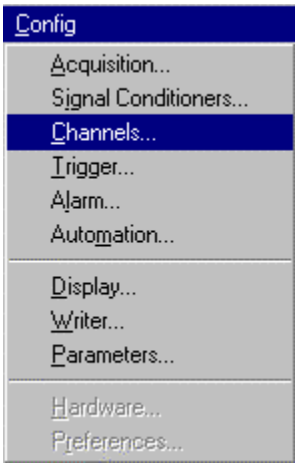
The Parameter display can be moved to any area of the screen by clicking and dragging on the double separator lines at the top using the mouse.

In order to view the parameter windows displays as shown below, you must first establish parameters in the *Config…Channels* dialog as described earlier in this Chapter. As you enable Parameters, they are automatically added to a display on the right side of the screen.

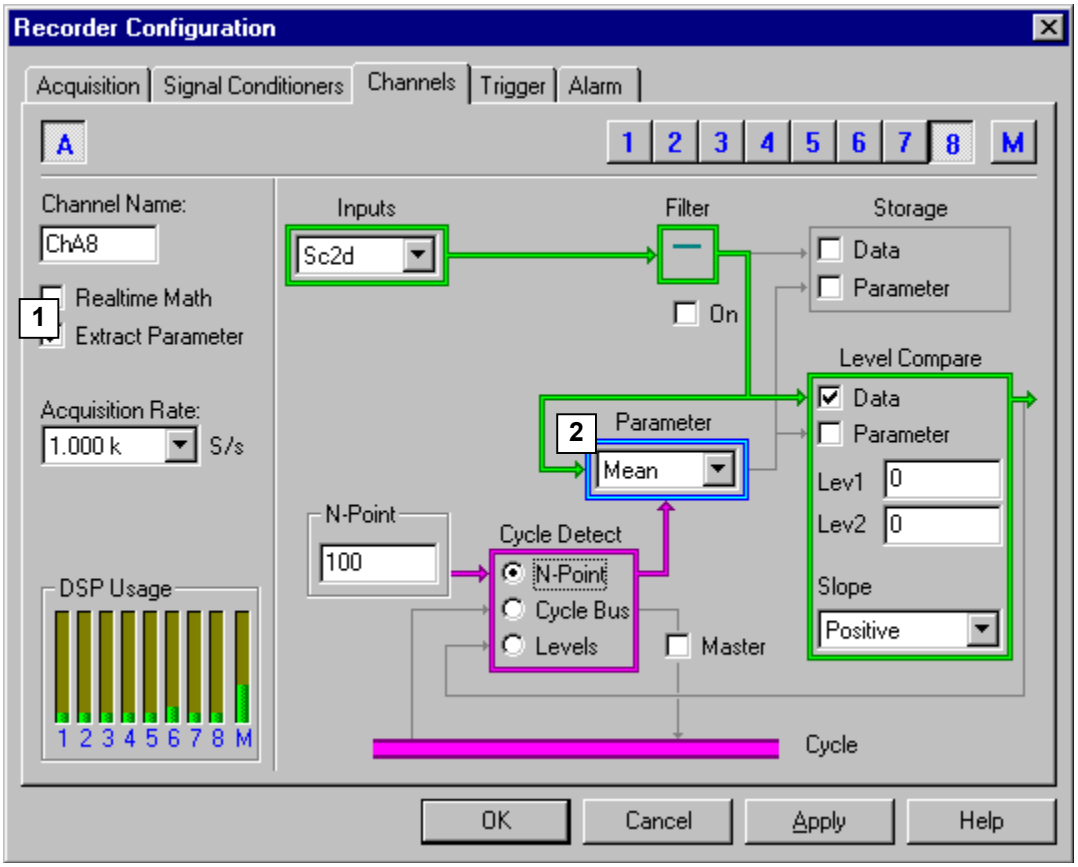


To establish parameters:

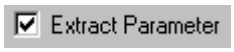
1. Select the ***Channels*** command from the ***Config*** menu.



The **Channels** tab of the **Recorder Configuration** dialog appears, allowing you to extract parameters



2. You must choose to extract a parameter for at least one channel to be able to view a parameter window. Choose a channel and click **Extract Parameter** (**1**).

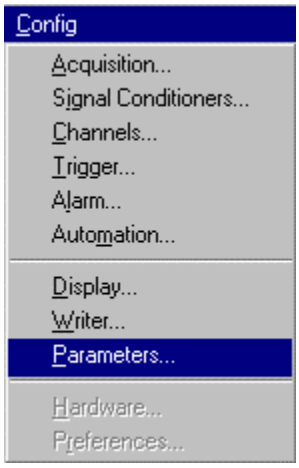


The Parameter area becomes active, allowing you to choose a parameter to extract (**2**).

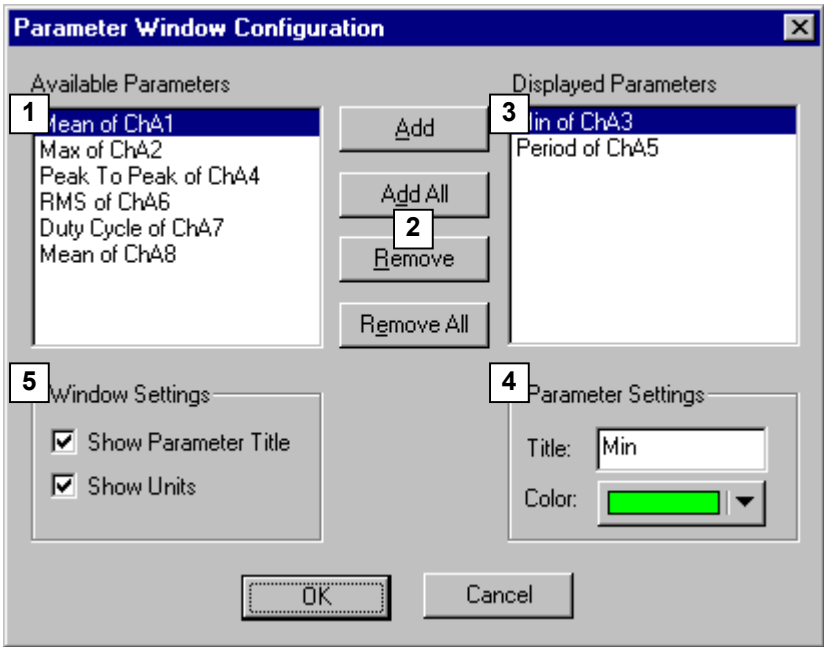
Click on a parameter to select it. Once you have selected a parameter, it will automatically appear on the screen. Select parameters for all the desired channels, then click **OK** to accept the settings. For more detailed information on Parameter Extraction, see the *Configure…Channels* section earlier in this Chapter.

To modify which parameter windows are displayed on screen:

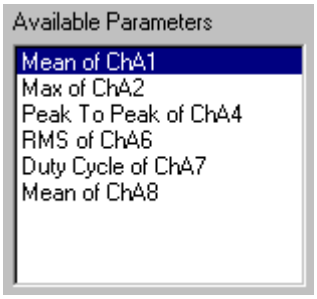
1. Select the ***Parameters*** command from the ***Config*** menu.



The **Parameter Window Configuration** dialog appears.



2. Click on a parameter to display from the list in the **Available Parameters** area (**1**).



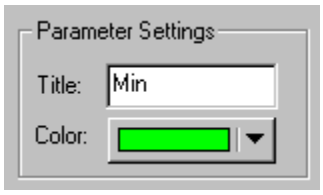
Only extracted parameters chosen from the **Channels** tab of the **Recorder Configuration** dialog appear in this list. If no parameters are currently being extracted, no parameters appear in the list.

3. Use one of the option buttons (**2**) to choose which parameters to display.

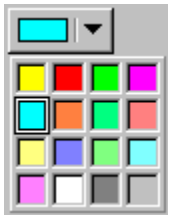
When you click the **Add** button, the parameter you selected is moved to the **Displayed Parameters** area (**3**). You add all the **Available Parameters** at once by clicking **Add All**. When you have moved at least one parameter to the **Displayed Parameters** area, the **Remove** and **Remove All** buttons become active.

If you decide to remove a parameter from the **Displayed Parameters** area, click on the parameter and click **Remove**. The parameter is moved back to the **Available Parameters** area. You can move all the parameters to the **Available Parameters** area by clicking the **Remove All** button.

4. You can enter a title and a color for each parameter you select in the **Parameter Settings** (**4**) area. The title is used for the **Show Parameter Title** option. The default colors match the waveform colors, and the default title is the name of the measurement.



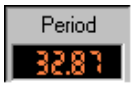
Choose a color for the selected parameter by clicking on a color in the drop down **Color** menu.



5. Using the options in the **Windows Settings** area (**5**), you can display the parameter windows several ways in the main **Recorder Display.**

The following examples show the effects of the different combinations of selections available for displaying the parameter windows.

Show Parameter Title and **Show Units** both selected.

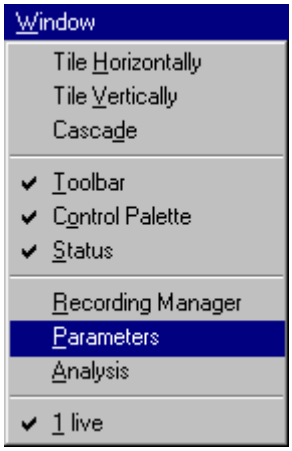


Show Parameter Title only selected.

Show Units only selected.

No options selected.

6. Click **OK** to enter your parameter window configurations and exit the dialog or click **Cancel** to exit the dialog without changing configurations.
7. The parameter windows can be turned off and on by selecting the ***Parameters*** command from the ***Window*** menu or by clicking the **Parameters** tool command in the **Toolbar**.



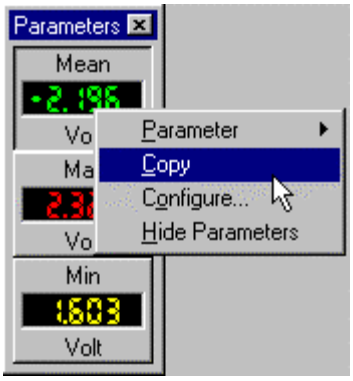

This menu command has the same effect as the **Parameters** tool command in the **Toolbar**.

When you select this command, a check mark appears next to the command in the menu and the parameters panel appears in the **Recorder Display.** Selecting this command again hides the panel. The default location for the Parameter display is a single column on the side of the screen. By clicking the mouse on the upper separator lines in the Parameter windows, you may "un-dock" the display, resize it, and move it anywhere on the screen. It is then possible to display up to 32 Parameters. You can "re-dock" the display on any edge of the display by moving it there.

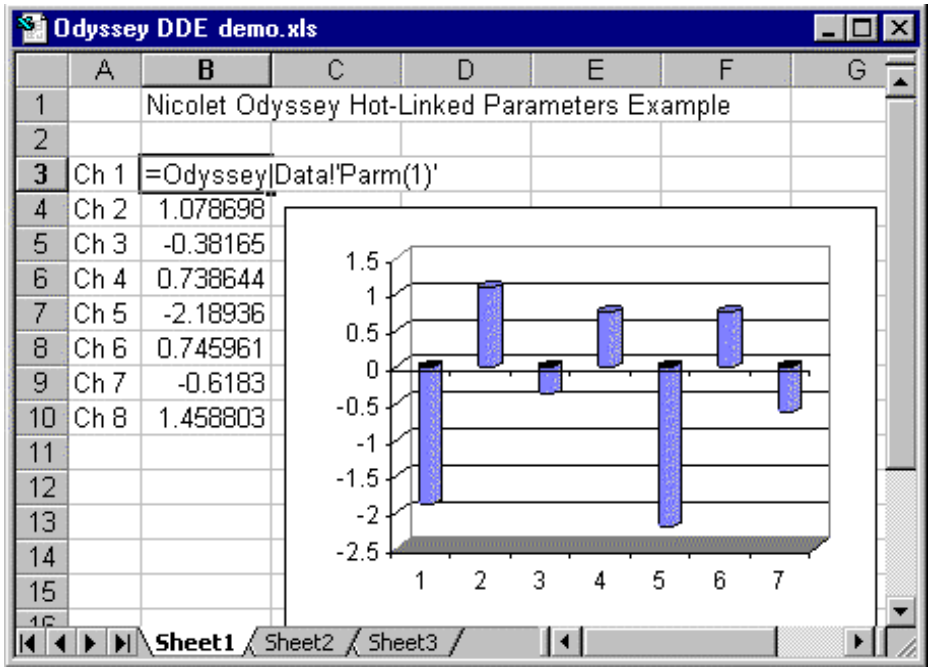
Using Parameters in Other Applications

The value of any **Parameter** can be copied and pasted to almost any Windows program. To copy Parameters to other programs such as a spreadsheet or a database:

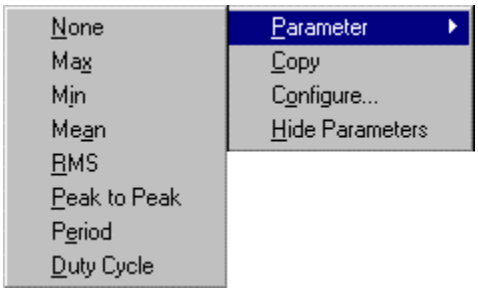
Click the right mouse button on a Parameter display and select **Copy**. Switch to your other program and select **Paste** from the **Edit** menu. The current value of the **Parameter** is inserted in your document.



To continuously update the value, you must have a program that supports Links such as Microsoft Word® or Excel®. Select **Paste Special** from the **Edit** menu and choose **Paste Link**. Each time Odyssey updates the **Parameter** (about once a second), the new value will be sent to your program as well. The links are saved along with your document. You can repeat this process to copy any number of **Parameters** to other programs.

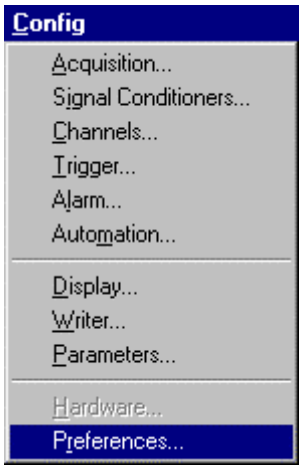


Note: *You can easily change the parameter displayed in each parameter window, copy it to the Clipboard, configure the parameter display, or hide the parameter panel by clicking the right mouse button on a parameter window. The following menu is displayed, allowing you to select changes for the parameter panel.*



Hardware

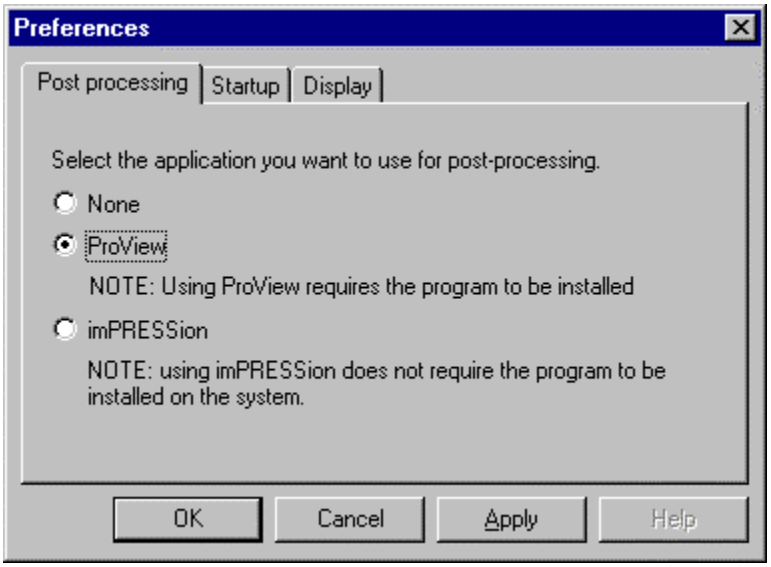
This command option is not available. It is reserved for possible future expansion.



Preferences

This command allows you to choose a number of settings options. You may select to which program data is posted for analysis, enable several startup options and choose your display style.

The **Preferences** dialog appears as shown below.

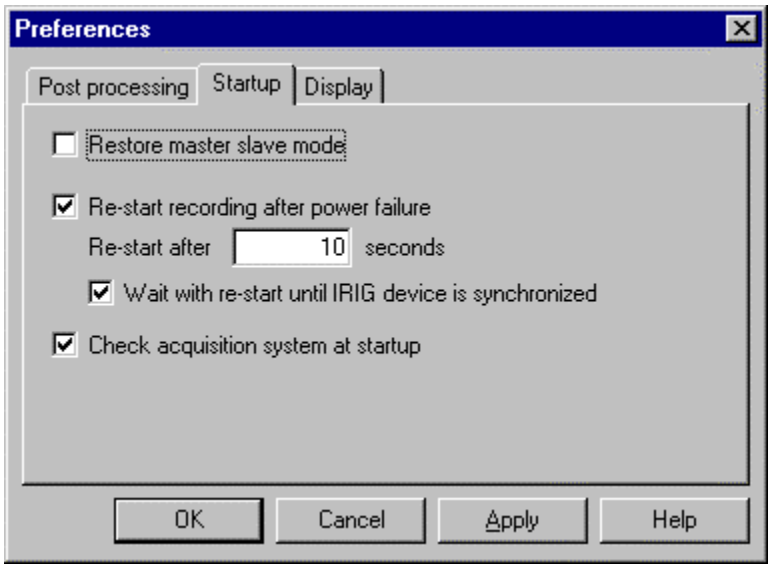


The **Post processing** tab selects which program receives data when you select ***Time Domain Analysis*** in the menu, from the Toolbar, or in the Odyssey Recording Manager. It also determines which software is used for Automation features you enable in the ***Config…Automation*** dialog.

- **None:** The Time Domain Analysis menu item and Toolbar icon are greyed and unavailable.
- **ProView:** Data will be sent to Nicolet ProView software for analysis by direct memory-to-memory transfer for the highest speed and convenience. ProView must be installed on the local system. After you select the ProView option, the Odyssey application must be restarted to recognize the direct linking.
  If you are using Odyssey Offline on a PC, a parallel port dongle must be installed to enable the ProView software.

- **ImPRESSion:** Data will be sent to a Nicolet imPRESSion database file for analysis. ImPRESSion may be installed either on the local system or on any PC on your network.

When you select the middle tab, the **Startup** dialog appears as shown below.



- **Restore master slave mode:** Disabled by default. If you have a number of Odysseys connected in a Master/Slave configuration, the menu command ***Control…Master/Slave*** determines whether this Odyssey should operate standalone, or wait to synchronize with the other systems.
  If you enable this checkbox, the Odyssey will start up in Master/Slave mode if it was shut down while in Master/Slave mode. If you disable this checkbox (default), the Odyssey will always start up in standalone mode with Master/Slave switched off.

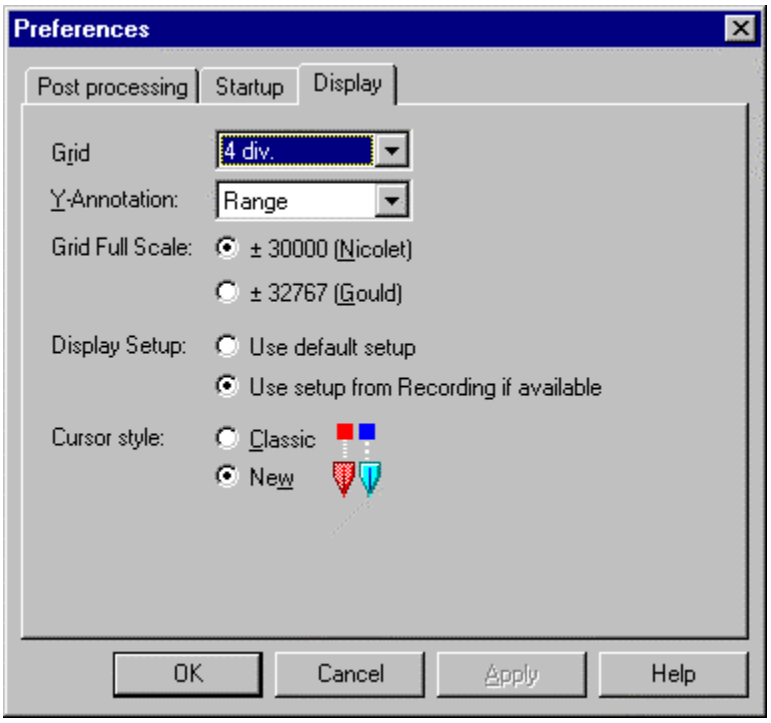
- **Re-start recording after power failure:** Enabled by default. If power is lost during a Recording, the Odyssey will start another Recording when power is restored. If this box is unchecked, no new Recording will be started.

  Re-start after xx seconds: Set to 10 seconds by default. When restarting after a power failure, Odyssey waits for this period before recording and presents a message allowing a user to cancel the new Recording if desired. The value may be modified to reduce the delay or give an operator more time to respond.

  Wait with re-start until IRIG device is synchronized: Enabled by default. If your system is equipped with the optional IRIG or GPS/IRIG card, these devices may take time to resynchronize their precision time after starting up. By default, the Odyssey will wait for the IRIG or GPS signal to lock onto the input. Disable this checkbox if you are operating without a timecode signal input, for example in field tests.

- **Check acquisition system at startup:** Enabled by default. The Odyssey will conduct normal power-up self-tests and self-calibration. If you disable this checkbox the startup tests will be skipped and power-up will be slightly faster.

When you select the third tab, the **Display** dialog appears as shown below.

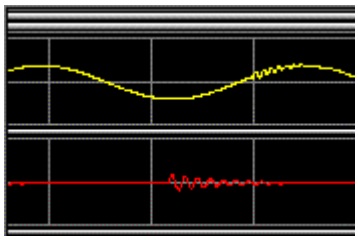
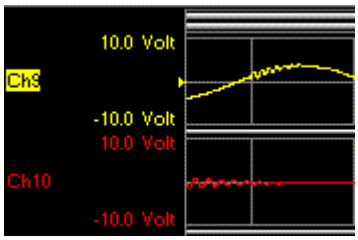
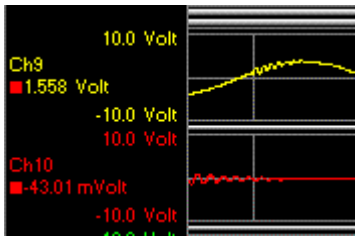
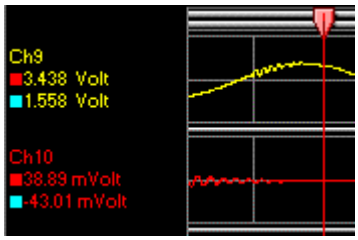


This tab allows you to change the display grid and numeric annotation.

Grid: Provides a number of selections for the number of vertical gridlines in the **Recorder Display**.

> **Off:** No gridlines are shown.
>
> **Auto:** The number of vertical gridlines will be automatically set for a pleasing display based on the pane height. A pane of large size will have more gridlines than a smaller one.
>
> **Number:** Fixed grid selections of 2, 4, 6, 8 and 10 are available. Each pane will always have the selected number of vertical gridlines.

Y-Annotation: Provides a number of selections for displaying the numerics on the left side of each pane. Selections of None, Range, Active Cursor and Cursor Values are available. The effect of each is shown below.

Annotation Off maximizes display area 	**Range** shows the digitizer range 
Active Cursor shows the Range plus the value at the Red cursor 	**Cursor Values** shows the values at both cursors 

Grid Full Scale: Selects the digital value that the grid uses for the nominal full scale. This allows the software to provide convenient grid lines such as 5.0 V/div rather than 5.46 or 4.57 V/div. A Nicolet recorder in the 20 volt range defines ±30,000 digitizer levels as ±10.00 volts. A Gould recorder in the same range defines ±32,767 as ±10.00 volts. Select **Nicolet** when you are viewing Recordings from your Odyssey. This affects only the grid display.

Display Setup: Controls how the display is arranged when you open a Recording.

> **Use default setup:** The display will always be in a fixed format you have saved as your preferred default, using the menu item File…Display Setup…Save as Default Display. This is useful if, for example, you wish to review only a few selected channels from a number of different Recordings.
>
> **Use Setup from Recording if available**: The Recording will be displayed in the same format in which it was recorded. This is the default selection. Recordings made under earlier versions of software may not contain the display format information. If this information is not available, the default display setup is used.

Cursor Style: Selects between two styles of cursor "handles." The **New** style is slightly larger and easier to move with the mouse.

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Chapter 9:
Using the Control Menu

Control Menu

The ***Control*** menu contains commands that allow you to start and stop a recording and place the system in Pause mode.

Standby (Pause)

The ***Pause*** command begins displaying, but does not record the data. You can see the incoming data on the **Recorder Display**, but the data is not saved. It is useful for setting up the channels and verifying expected conditions before recording.

Start Recording

The ***Start Recording*** command begins data acquisition and begins recording the data. This data is stored permanently on the acquisition disk and can be moved to a library shelf using the **Recording Manager.**

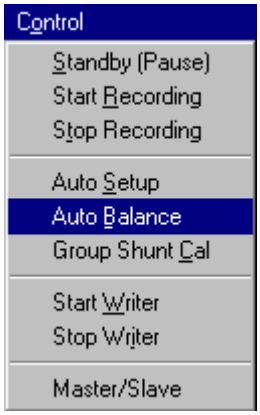
Stop Recording

The ***Stop Recording*** command ends data acquisition in both the recording and Pause modes. The most recent recording is displayed on screen.

When a recording is stopped, Odyssey builds a table of timing and trigger links so that access during playback is very fast. This process takes more time on longer recordings or when many triggers are present. For a recording of many hours or one that contains hundreds of triggers, a wait of a few minutes may be required.

Auto-Setup

The ***Auto-Setup*** command causes the system to scan all active inputs for a few seconds and set the input span and offset appropriately for each signal. It requires continuous dynamic signals of 1 Hz or higher frequency. It has no effect on sample rate or scroll rate.



Auto Balance

The ***Auto Balance*** command applies only to bridge amplifiers. When selected, this control balances all bridge amplifiers which you select for Group Balance. Any channels which fail to balance are reported by channel in an error message. Refer to *Bridge Amplifier* instructions in Chapter 8 for full details.

Group Shunt Cal

The ***Group Shunt Cal*** command applies only to bridge amplifiers. When selected, this control switches in the Shunt calibration resistors in all Bridge Amplifiers in the system. If in Record or Pause mode, the shunt calibration readings are immediately reflected on the traces and in the readout of any extracted Parameters. Using this control, a test recording to verify calibration on all channels requires only a few keystrokes. Click on the control a second time to switch off all relays. Refer to the *Bridge Amplifier* section of Chapter 8 for details on configuring shunt calibration resistors.

Start/Stop Writer

The **Start Writer** control begins a stripchart or page-by-page output of the current Recording to the currently selected writer. It uses the settings you enter in the *Config…Writer* dialog (Chapter 8.) This control has the same effect as pressing the front panel Writer button. Select the **Stop Writer** control to terminate the output before completion. The Windows printer buffer may still contain some data which will continue to print even after Stop is selected.

Master/Slave

Master/Slave is a special mode that allows precise time synchronization of one or multiple Odyssey mainframes. A Master Odyssey must be equipped with the optional IRIG or GPS card, and up to seven Slave Odysseys receive their digitizer clock signal from the Master's precision clock. If this menu item is grayed out, your system does not contain an IRIG/GPS card (if Master) or does not have the Slave cabling installed (if Slave.)
Master/Slave must be enabled to capture the precision IRIG time, even on a single Odyssey.

To make a synchronized Master/Slave Recording on one or a number of Odyssey mainframes:

1. Make the desired acquisition settings on all channels of each mainframe. It is strongly recommended you give unique names to each channel for ease of identification after the Recording is made. Confusion will result if each mainframe has a "Ch1."
2. With power off on all systems, connect the Master and Slave cables. Refer to Appendix A, *Installing and Using IRIG/GPS Options* for instructions if required.
3. Select **Master/Slave** mode on all the mainframes' ***Control*** menu. This allows all mainframes to be controlled by the global Acquire signal. It also enables the IRIG card's precision timestamp capture.
4. To assure that all mainframes remain synchronized, the Master/Slave setting prevents the Pause mode from being used. To use Pause for monitoring while setting up your systems, temporarily turn off the Master/Slave setting.
5. Press the **Start** button on the front panel of each mainframe. All systems will wait until a global Acquire signal is released by the last mainframe. The mainframes will begin recording synchronously when the last Start button is pressed. The precise Start time is captured by the IRIG card's event latch. The digitizer clock is directly derived from the IRIG signal.
6. To end the Recording, press **Stop** on the front panel of any mainframe. All mainframes will terminate recording.

All samples are precisely time-aligned within a few nanoseconds by the Master's clock signal. The Recordings on all systems will be precisely the same length. However, only the Master's Recording contains the precise Start time from the IRIG/GPS time code. IRIG time is accurate to approximately 10 microseconds. GPS time is accurate to approximately 2 microseconds. See Appendix A for more information on the IRIG and GPS options.

To conveniently set up, control, monitor, and display data from a number of Odyssey mainframes on your PC, Nicolet offers an optional Master Control software. This package offers integrated control of all channels in a spreadsheet format, and merges the individual Recordings into one synchronized file. Please contact your Nicolet representative for full information.

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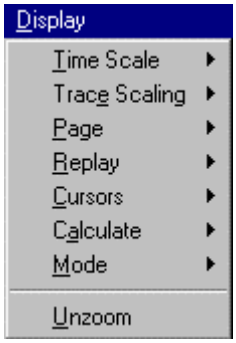
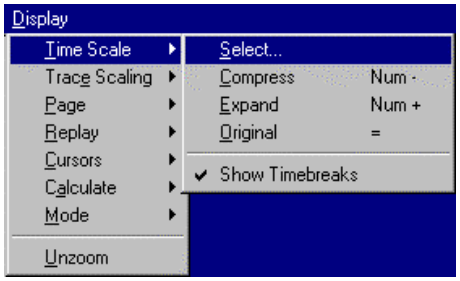
Chapter 10:
Using the Display Menu



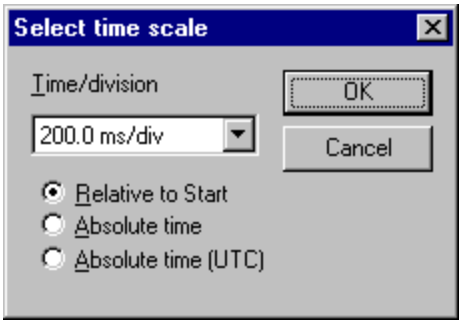
Display Menu

The ***Display*** menu contains commands that allow you to change the way you view data in the main **Recorder Display**. The same menu is displayed by clicking on the right mouse button in the **Recorder Display.**



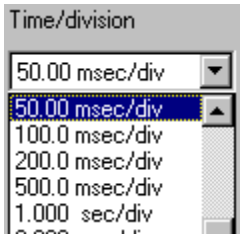
Time Scale -> Select

The ***Time Scale -> Select*** command opens a dialog that allows you to select a specific time/division for the **Recorder Display**.



To select a time scale:

1. Select a value for the **Time/division** from the drop down menu.



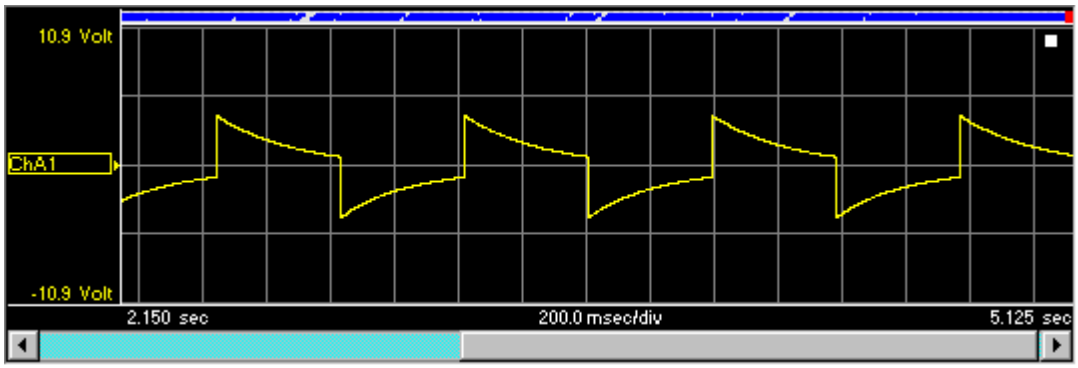
2. Select the time reference.
   Relative to Start displays hours:minutes:seconds.milliseconds since the start of recording.
   Absolute Time displays local time-of-day, with the date and local time in hours:minutes:seconds.milliseconds.
   Absolute Time (UTC) displays Coordinated Universal Time in a 24-hour format of hours:minutes:seconds.milliseconds.

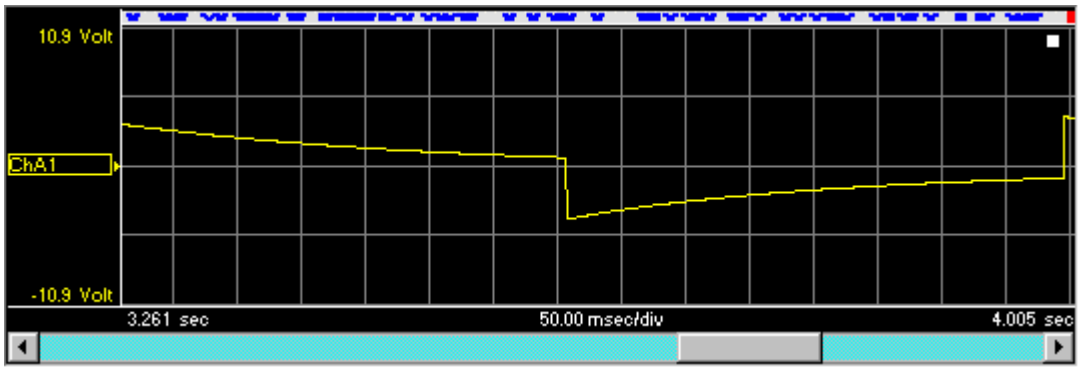
   In the Recorder Display, time is displayed with a resolution of one millisecond. Greater resolution is available in the Cursor Values box.

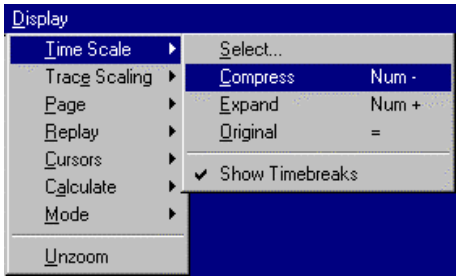
   The time is normally taken from the PC's clock, which you may set with a typical accuracy of a few seconds. If the optional IRIG or GPS card is installed, the time readings are taken from the timecode input. The times are then accurate to approximately 10 microseconds for IRIG, 2 microseconds for GPS when tracking a timecode input signal. Correct tracking is indicated by a green IRIG indicator in the corner of the Recorder Display.

3. Click **OK** to exit the dialog and change the **Recorder Display** or click **Cancel** to exit without changing the time scale.

The following example shows the effect of changing the time scale from 200.0 msec/div (top) to 50.00 msec/div (below).



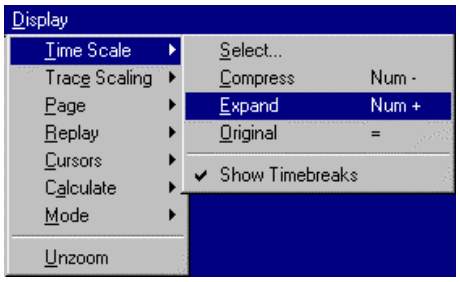




Time Scale -> Compress

The ***Time Scale -> Compress*** command compresses the time scale in the **Recorder Display** to the next greater time per division, showing more data on screen.

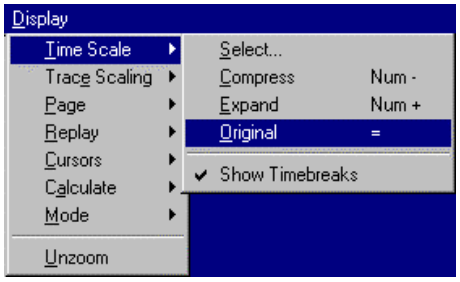
 This menu command has the same effect as the **Compress Time Scale** tool command in the **Toolbar** and the keyboard "-" key in the numeric pad.



Time Scale -> Expand

The ***Time Scale -> Expand*** command expands the time scale in the **Recorder Display** to the next lower time per division, creating a zoom effect.

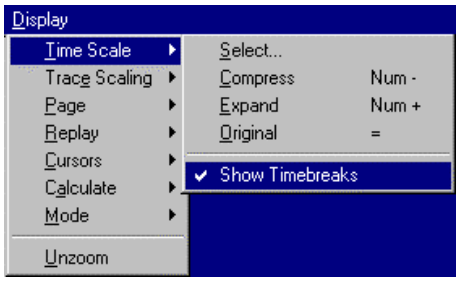
 This menu command has the same effect as the **Expand Time Scale** tool command in the **Toolbar** and the numeric keypad "+" key.



Time Scale -> Original

The ***Time Scale -> Original*** command restores the time scale to the original value, canceling compression or expansion.

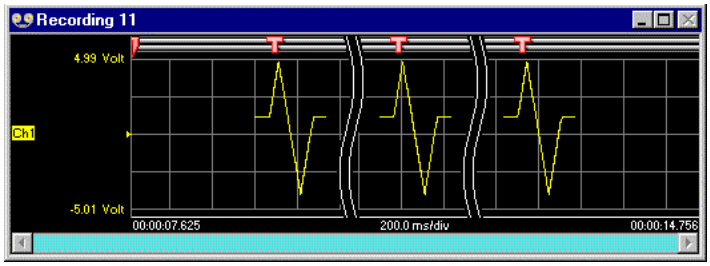
This menu command has the same effect as the numeric keypad "=" key



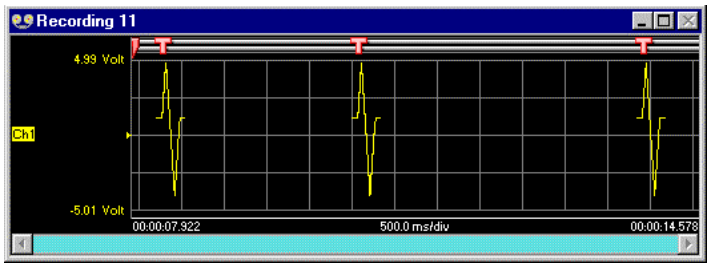
Time Scale -> Show Timebreaks

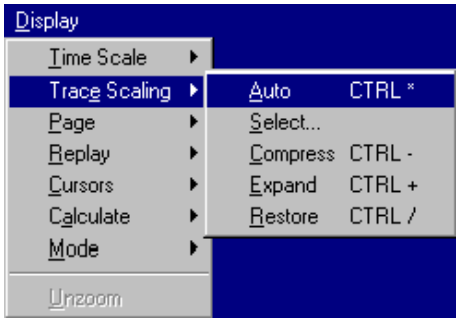
The OD-200 acquisition card can record at a high rate upon triggers, then record nothing between triggers similarly to a transient recorder. The ***Time Scale -> Show Timebreaks*** command, when enabled, displays the triggers adjacently on the screen with a break symbol between them. The time numerics continue to correctly reflect their absolute time. When disabled, the Recording is displayed in linear time with gaps between triggers. This selection is useful if you wish to print an overview with the actual time between triggers reflected.

Show Timebreaks On



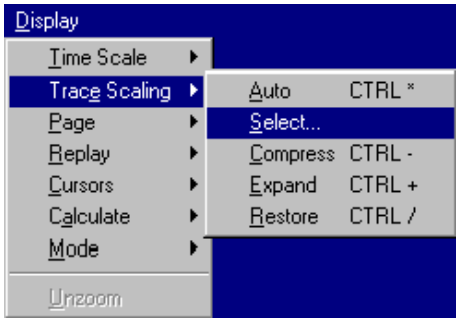
Show Timebreaks Off





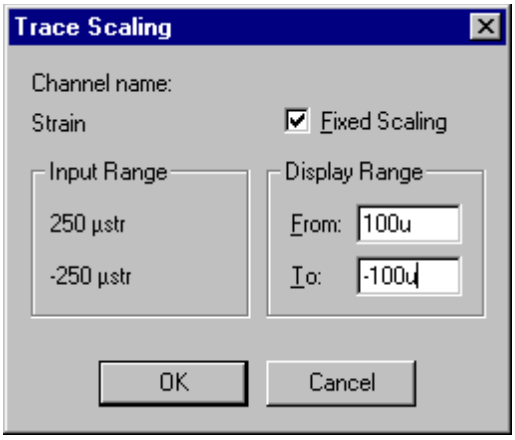
Trace Scaling -> Auto

The ***Trace Scaling -> Auto*** command automatically expands the selected trace vertically to fill the screen based on the current screen contents. It operates during all recording modes: Stop, Record and Pause. The keyboard shortcut Control - * (asterisk) has the same effect



Trace Scaling -> Select

The ***Trace Scaling -> Select*** command opens a dialog that allows you to set the display to any desired vertical range. It is typically used to more comfortably view a subset of the full input span, while retaining the full digitizer dynamic range. It affects only the display, not the recorded data.



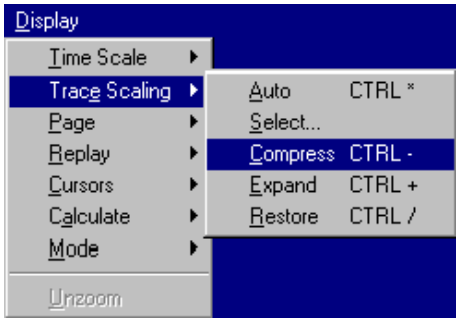
The **Trace Scaling** dialog indicates the name of the selected channel and the current **Input Range** in technical units.

To expand the display to show a subset of the full ADC range:

1. Click the **Fixed Scaling** checkbox.
2. In the upper box, enter the desired value for the top of the display. You may include "k" for thousands, "m" for milli-, "u" for micro-, etc.
3. In the lower box, enter the desired value for the bottom of the display.
4. Click **OK** to accept the settings.

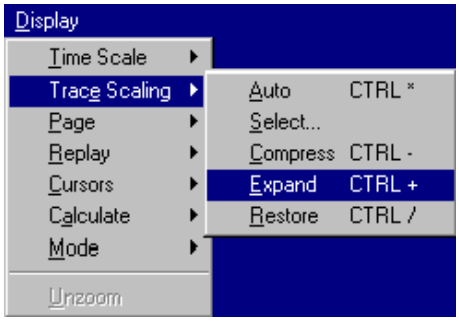
To restore the display to the full ADC input range:

1. Click the **Fixed Scaling** checkbox a second time to remove the check mark.
2. Click **OK** to accept the settings.



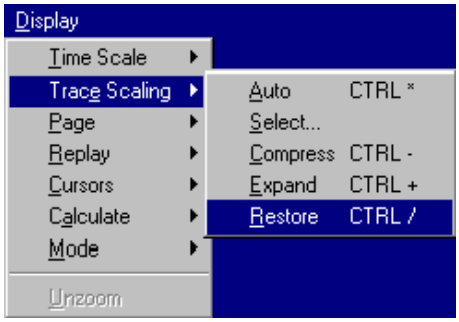
Trace Scaling -> Compress

The ***Trace Scaling -> Compress*** command vertically compresses the selected trace to show a greater portion of the input range. It operates during all recording modes: Stop, Record and Pause. The keyboard shortcut Control - (minus) has the same effect



Trace Scaling -> Expand

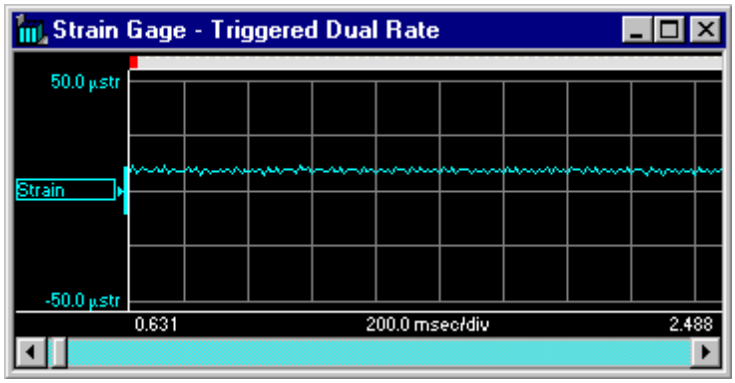
The ***Trace Scaling -> Expand*** command vertically expands the selected trace to zoom in on a smaller portion of the input range. It operates during all recording modes: Stop, Record and Pause. The keyboard shortcut Control - + (plus) has the same effect

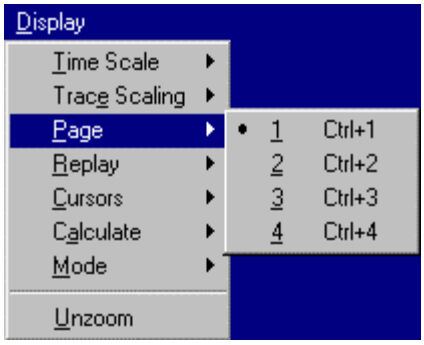


Trace Scaling -> Restore

The ***Trace Scaling -> Restore*** command resets trace scaling so that the full input range is again displayed. It operates during all recording modes: Stop, Record and Pause. The keyboard shortcut Control - / has the same effect

When Trace Scaling has been applied, a vertical bar appears in the numeric display on the left edge of the display. The size of the bar is proportional to the amount of the input range being displayed. This display shows a trace that has been zoomed by a factor of five.

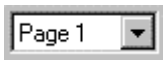




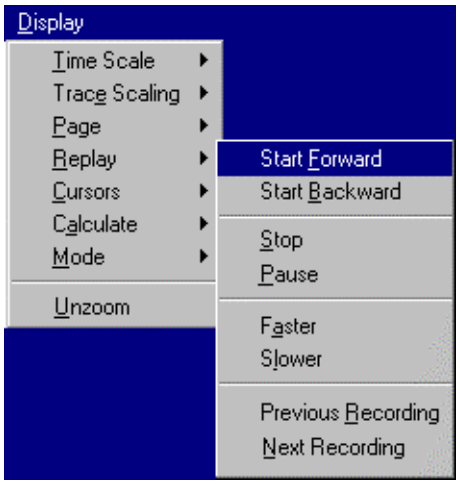
Page

The ***Page*** command changes the **Recorder Display** to the selected page. By default, four pages are displayed and each page represents one of the acquisition boards installed in the Odyssey system. The currently displayed page appears with a black dot in front of it. You can only display one page at a time.

Note: *By default, a page is assigned to each board in the system. However, it is possible to put any waveform from any board on each page. You may also add and delete pages. See Config…Display in Chapter 8 for details.*



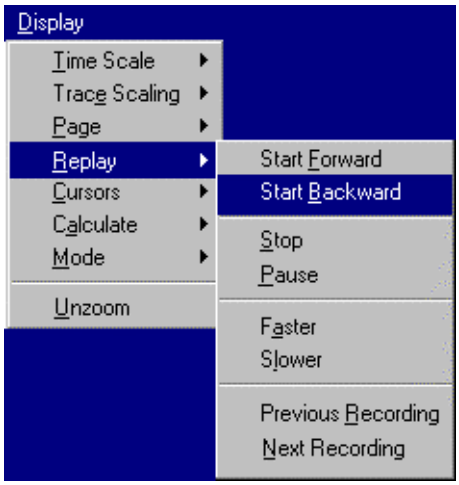
This menu command has the same effect as the **Activate Page** tool command in the **Toolbar**. You can also press the **Control** key and the page number, 1, 2, 3, …9.



Replay -> Start Forward

The ***Replay -> Start Forward*** command begins forward replay of the current recording in the **Recorder Display**.

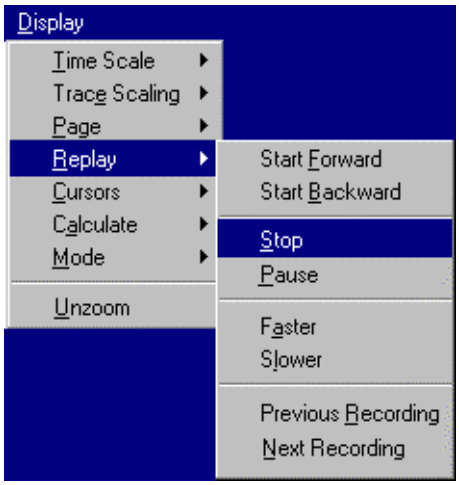
This menu command has the same effect as the **Replay Forwards** button in the **Control Palette**.



Replay -> Start Backward

The ***Replay -> Start Backward*** command begins backward replay of the current recording in the **Recorder Display**.

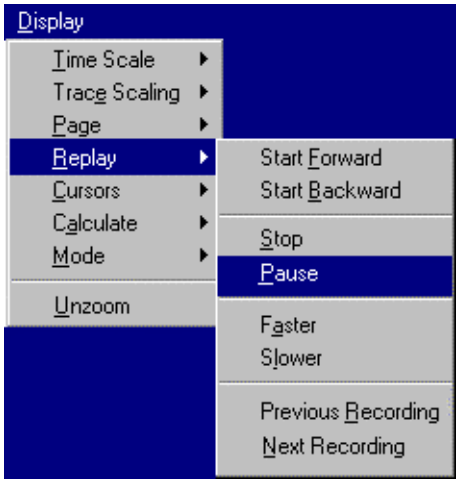
This menu command has the same effect as the **Replay Backwards** button in the **Control Palette**.



Replay -> Stop

The ***Replay -> Stop*** command stops all replay of the current recording in the **Recorder Display**.

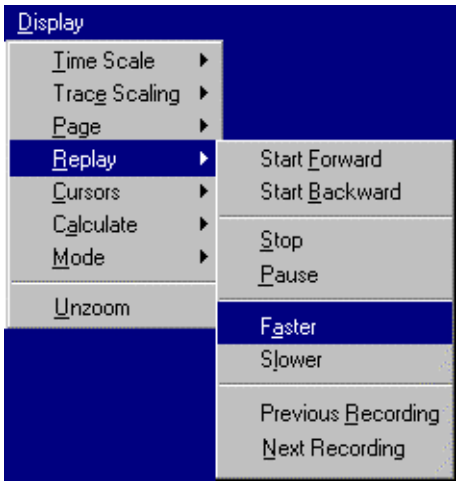
This menu command has the same effect as the **Stop Playback** button in the **Control Palette**.



Replay -> Pause

The ***Replay -> Pause*** command temporarily stops replay of the current recording. To resume, select the ***Start Forward*** or ***Start Backward*** command.

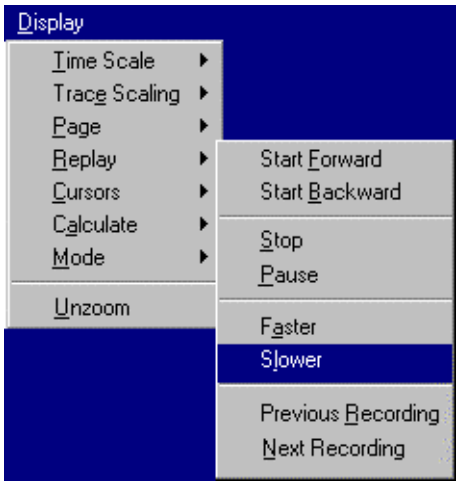
This menu command has the same effect as the **Pause** button in the **Control Palette**.



Replay -> Faster

The ***Replay -> Faster*** command increases the replay speed of the current recording in the **Recorder Display**. You can select this command multiple times until the speed is as fast as you require.

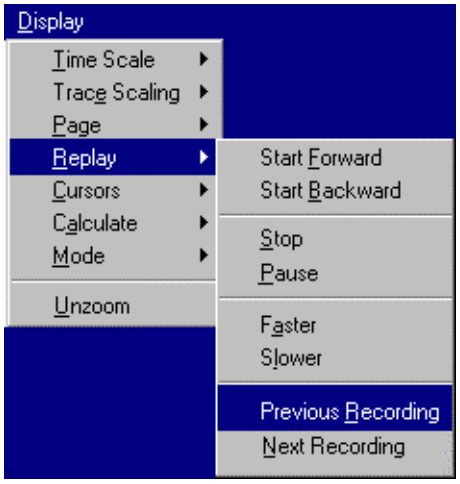
This menu command has the same effect as clicking the **Replay Forwards** button in the **Control Palette** multiple times.



Replay -> Slower

The ***Replay -> Slower*** command decreases the replay speed of the current recording in the **Recorder Display**. You can select this command multiple times until the speed is as slow as you require.

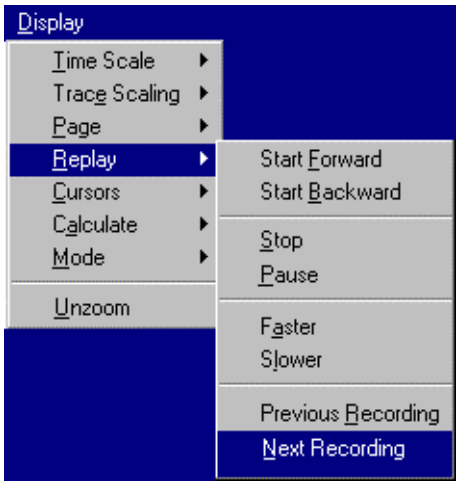
This menu command has the same effect as clicking the **Replay Backwards** button in the **Control Palette** multiple times.



Replay -> Previous Recording

The ***Replay -> Previous Recording*** replaces the current recording with the recording just prior to it in the play list as shown in the **Recorder** in the **Recording Manager**.

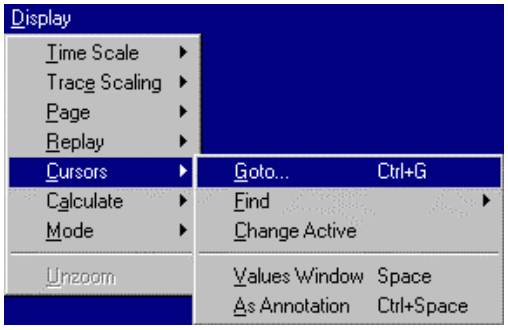
This menu command has the same effect as the **Open Previous Recording** button in the **Control Palette**.



Replay -> Next Recording

The ***Replay -> Next Recording*** replaces the current recording with the recording just after it in the play list as shown in the **Recorder** in the **Recording Manager.**

This menu command has the same effect as the **Open Next Recording** button in the **Control Palette**.



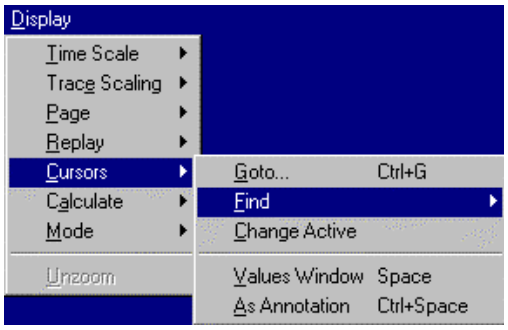
Cursors -> Goto

The ***Cursors -> Goto*** command opens a dialog that allows you to move the cursors by counter value, markers, triggers, bookmarks or level crossings.

You can also open the **Go To** dialog by clicking the right mouse button on the **Time** display in the **Control Palette**.

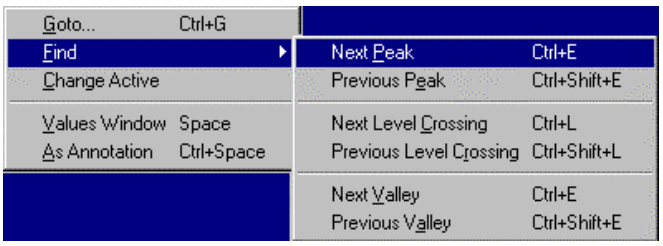
This menu command has the same effect as the **Goto** tool command in the **Toolbar**.

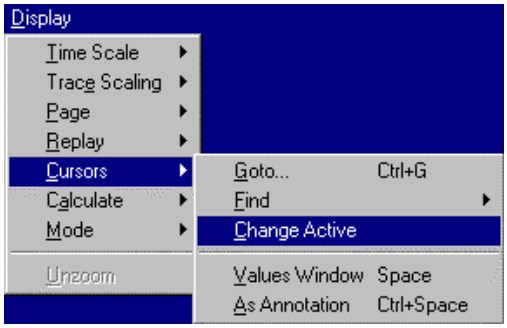
For more information on the **Goto** dialog, see the *Goto* section in Chapter 7.



Cursors -> Find

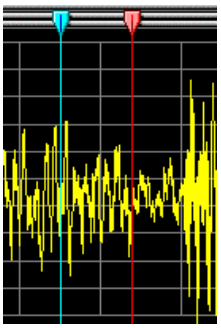
The ***Cursors -> Find*** command allows you to quickly locate features of interest on the currently selected waveform, without travelling to the Goto dialog. You can jump to the next or previous peak, valley or zero crossing. There are also convenient keyboard equivalents for even faster access.





Cursors -> Change Active

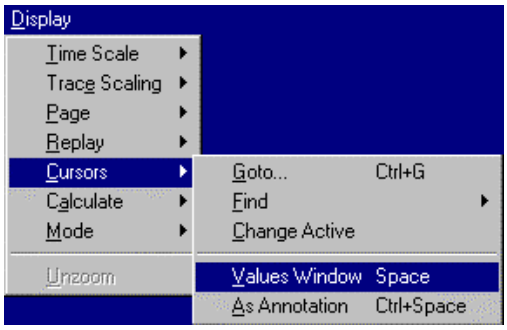
The ***Cursors -> Change Active*** command changes the active cursor.



The inactive cursor has a blue "handle" (small box at the top of the cursor) with a blue line.

The active cursor has a red "handle" and a red line in the display. Its time and voltage numerics are displayed at the bottom of the screen in the status bar. All the **Go To** and **Find** commands move the active cursor.

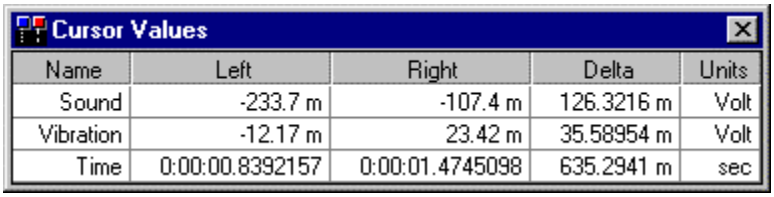
Selecting the ***Change Active*** command switches which cursor is the active cursor. Clicking the mouse on a cursor also makes that cursor active.



Cursors -> Values Window

The ***Cursors -> Values Window*** command opens the **Cursor Values** display, showing information about the cursors.


This menu command has the same effect as the **Cursor Values** tool command in the **Toolbar** or simply pressing the keyboard **Space Bar**.



Cursor Values

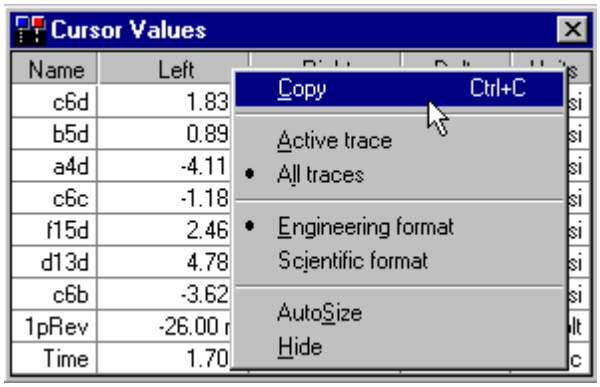
Name	Left	Right	Delta	Units
Sound	-233.7 m	-107.4 m	126.3216 m	Volt
Vibration	-12.17 m	23.42 m	35.58954 m	Volt
Time	0:00:00.8392157	0:00:01.4745098	635.2941 m	sec

The **Cursor Values** dialog displays the cursor values for each displayed channel and the Time axis. The left and right cursor values are shown, as well as the difference between the two locations (Delta). The units for each axis are also shown.

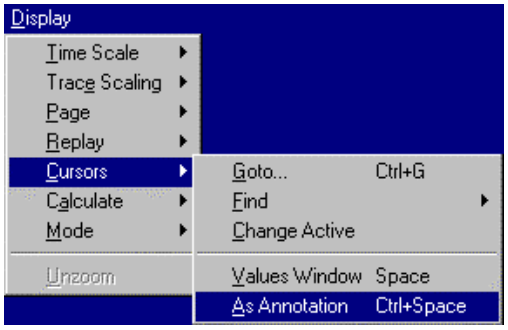
You can resize the columns by clicking and dragging the dividing line between columns.

Click the right mouse button inside the Cursor Values box to display a context menu allowing you to copy the values or modify the appearance of the display. After copying, the values may be

pasted into a spreadsheet or word processor. To retain full numeric precision in voltage and time when copying to a spreadsheet, the use of Scientific format is recommended. Most spreadsheets do not recognize time values with fractional seconds such as 11:22:33.456.

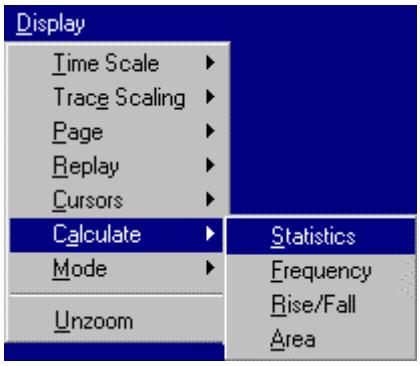


Microsoft Word Table				
c6d	1.833	-1.571	3.404	ksi
b5d	0.895	1.657	762.7 m	ksi
a4d	-4.113	1.225	5.339	ksi
c6c	-1.188	1.811	2.999	ksi
f15d	2.468	-2.287	4.755	ksi
d13d	4.787	2.827	1.960	ksi
c6b	-3.620	0.335	3.955	ksi
1pRev	-26.00 m	-06.33 m	19.67 m	Volt
Time	1.703	5.438	3.735	sec



Cursors -> As Annotation

The ***Cursors -> As Annotation*** menu command is now superceded by a greater variety of choices in the ***Config…Preferences*** dialog.

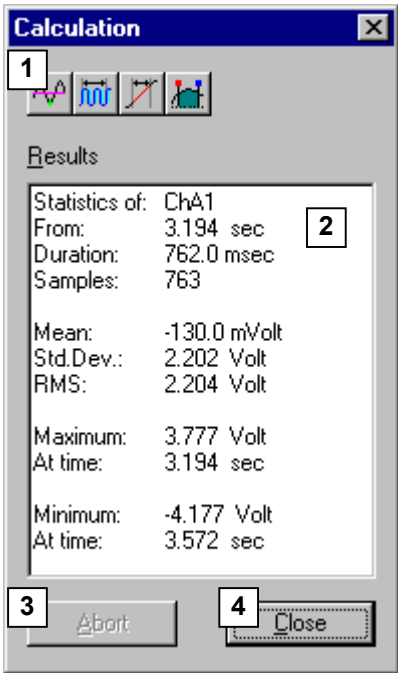


Calculate

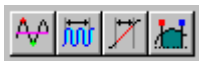
The ***Calculate*** commands open the **Calculation** dialog to the statistics results for the currently selected channel. The area between the cursors is analyzed. Odyssey automatically begins calculation when this command is selected and displays the results.

 This menu command has a similar effect as the **Calculate** tool command in the **Toolbar,** however it also begins the specific calculation.

The **Calculation** dialog presents calculation results for a channel selected before choosing the ***Calculate*** command. Select a channel by clicking on it in the **Recorder Display** and placing the left and right cursors before and after the area to be included in the calculation.



The **Calculation** dialog contains a toolbar (**1**), a Results area (**2**), an Abort button (**3**), and a Close button (**4**).



The toolbar enables you to view any of the four different calculation results with the click of a button.

The **Statistics** tool command displays calculation results that include mean, standard deviation, maximum, minimum, and RMS.

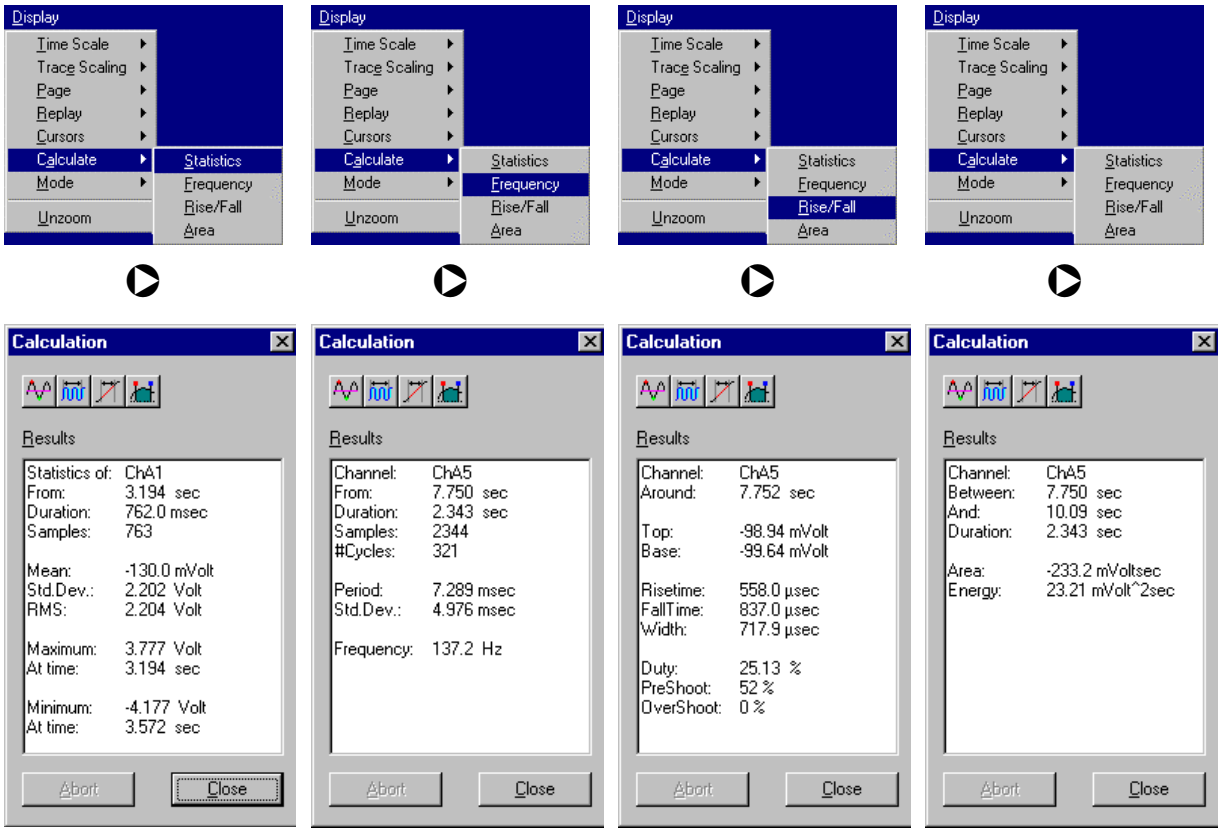
The **Frequency** tool command displays calculation results that include number of samples, number of cycles, period, standard deviation, and frequency.

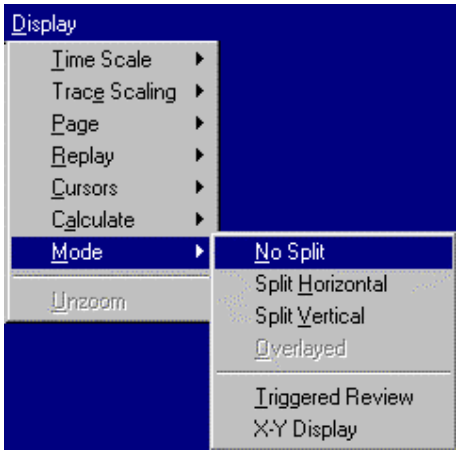
The **Rise/Fall** tool command displays calculation results that include top, base, rise time, fall time, width, duty, preshoot, and overshoot.

The **Area** tool command displays calculation results that include energy and area.

If you want to abort the current calculation in progress, click **Abort** (**3**) or click **Close** (**4**) to exit the dialog.

The following are examples of statistics, frequency, rise/fall, and area calculations, respectively. The calculation results may be selected and copied with normal Windows techniques. A right-mouse context menu provides Select All and Copy commands.

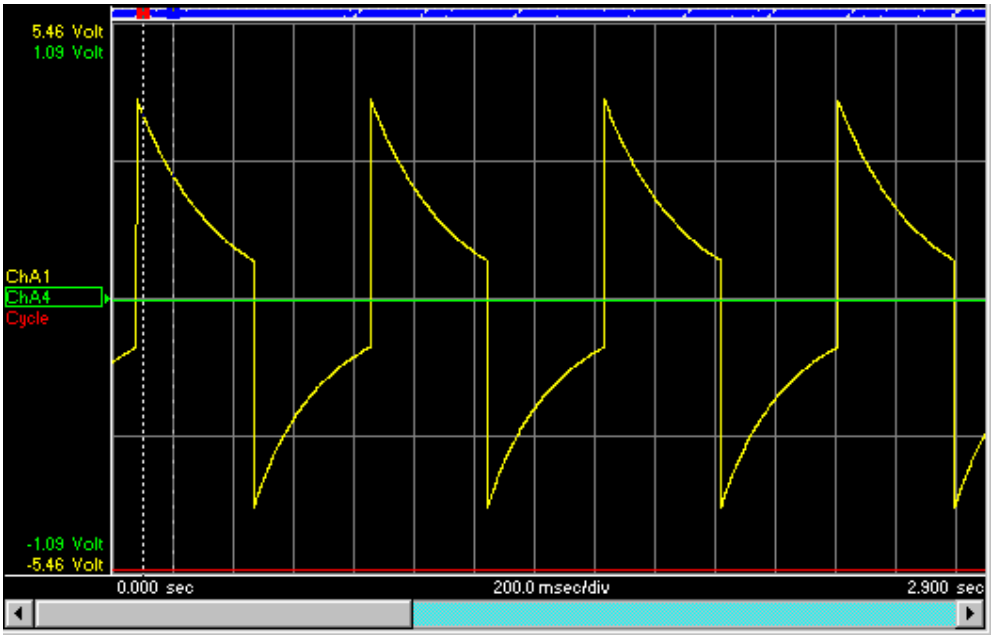


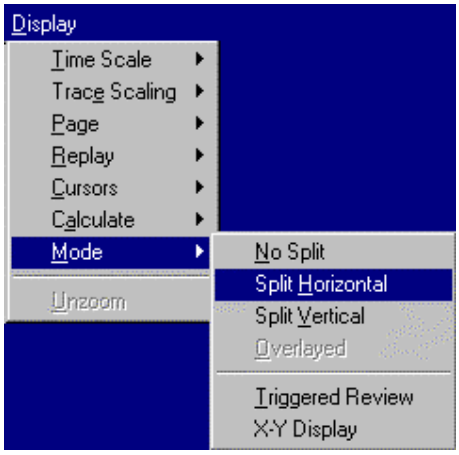


Mode -> No Split

The ***Mode -> No Split*** command returns the **Recorder Display** to a single window if it has been split.

This example shows the **Recorder Display** when it is not split.





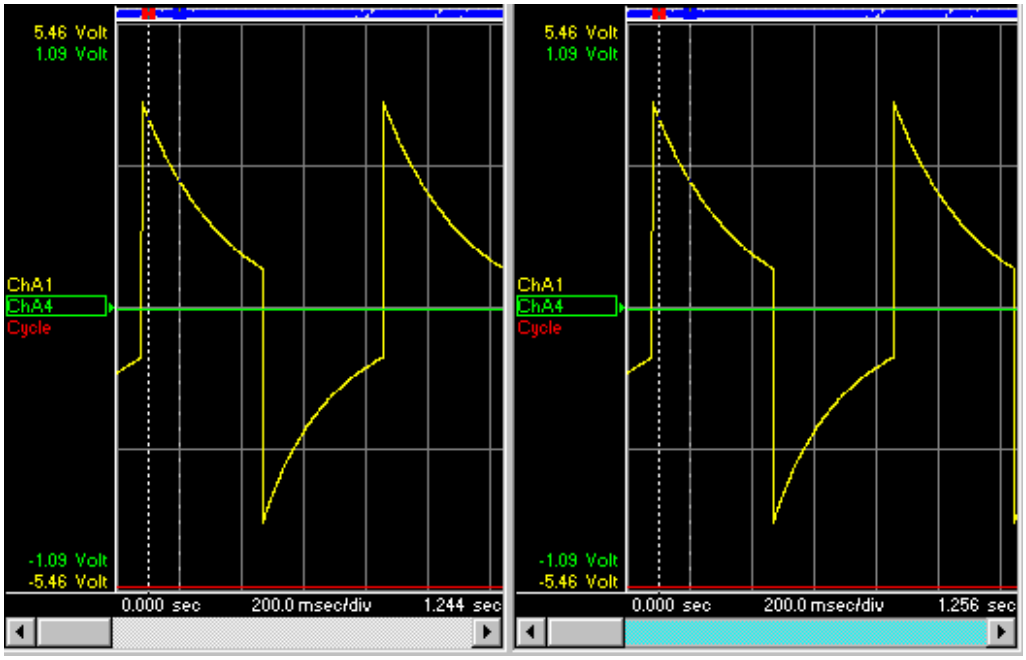
Mode -> Split Horizontal

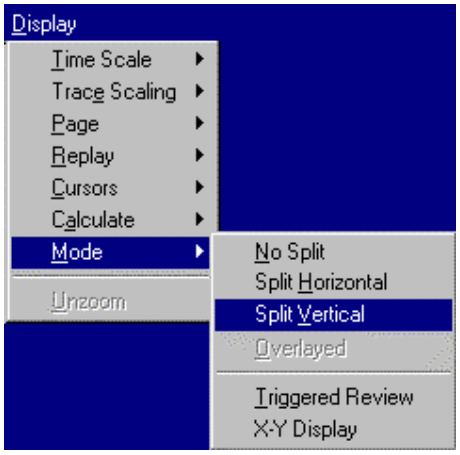
The ***Mode -> Split Horizontal*** command splits the **Recorder Display** into two side-by-side windows, allowing you to compare different areas of the same recording or two different recordings.

Select the recording in the left window with the **Previous/Next Recording** buttons on the control Palette, or by dragging from the ***Recording Manager***. At acquisition rates of 10 kS/s and slower (OD-100) or 100 kS/s and slower (OD-200), the split windows can be used to review an earlier portion of the current recording in progress. All but the most recent portion of the current recording may be scrolled, zoomed, searched, analyzed, exported, or plotted. This powerful feature allows you to begin your analysis before the recording is finished.

If you have zoomed an area, the display is automatically split vertically to show the zoomed area. The Split commands apply only to the unzoomed area of the display, so that you can split the unzoomed display while viewing a zoomed area from either window below.

This example shows the **Recorder Display** split horizontally.



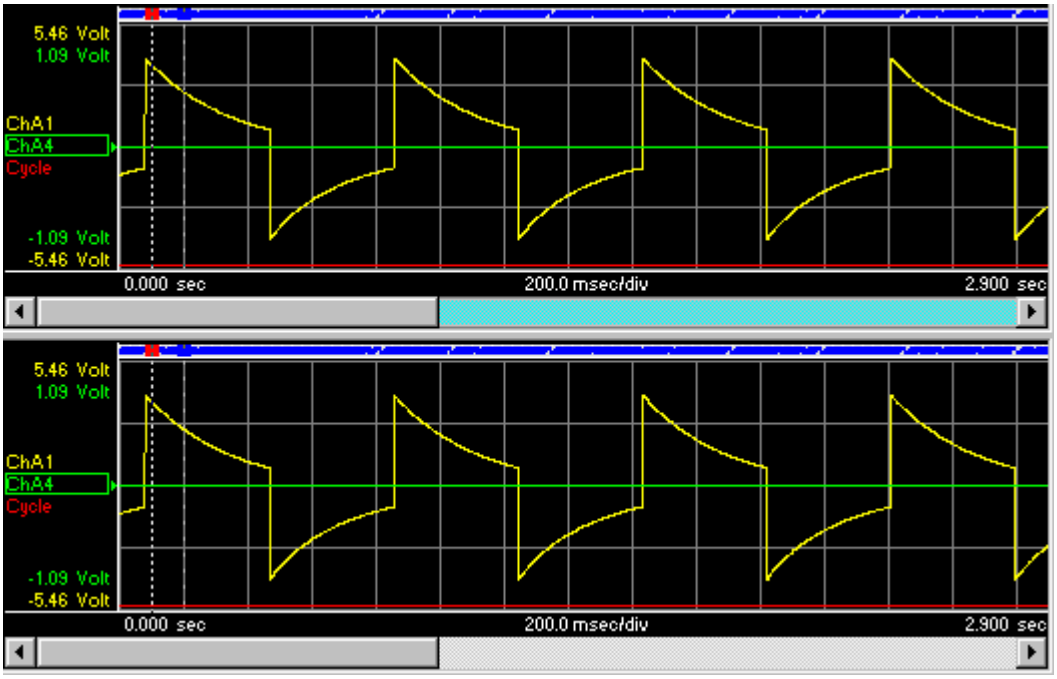


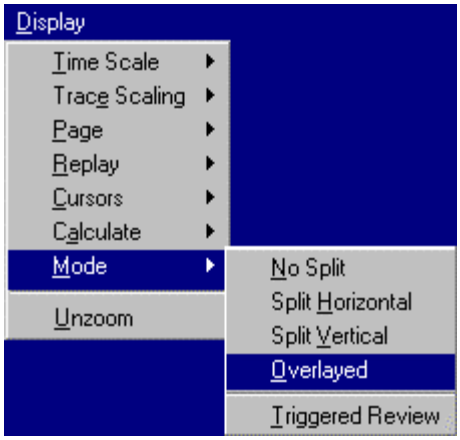
Mode -> Split Vertical

The ***Mode -> Split Vertical*** command splits the **Recorder Display** into two stacked windows, allowing you to compare different areas of the same recording or two different recordings.

This mode is similar in operation to the **Split Horizontal** command.

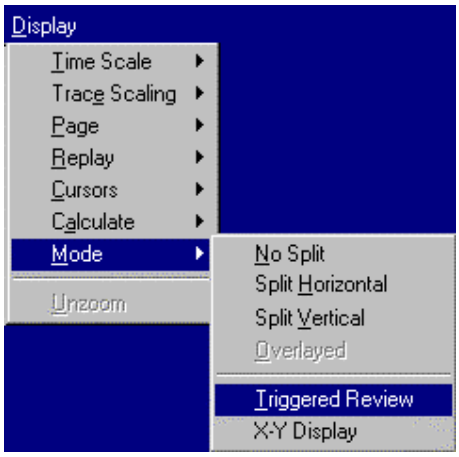
This example shows the **Recorder Display** split vertically.





Mode -> Overlayed

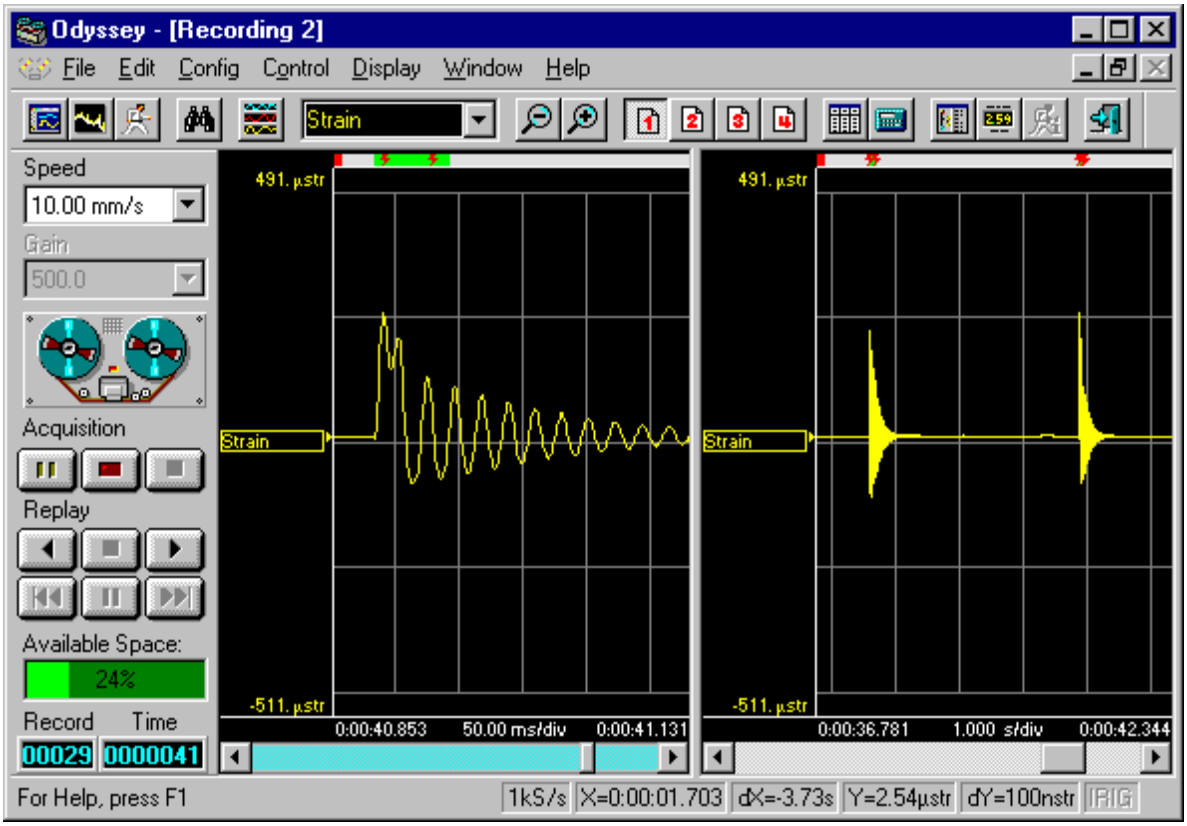
This command is not available in current versions.

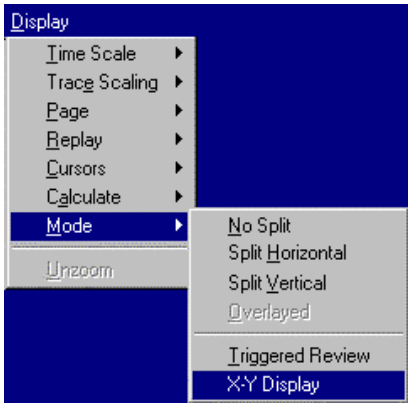


Mode -> Triggered Review

The ***Mode -> Triggered Review*** command opens a second window and places the most current trigger event in it for review. The Triggered Review window is captured for inspection, zooming, analysis, or plotting, while recording and scrolling continue in the Recorder window. This function only operates at acquisition speeds of 10 kS/s and slower (OD-100) or 100 kS/s (OD-200) At these rates the acquisition disks have sufficient time to read data while recording. See the example below.

Depending on the acquisition settings, there may be a delay of several seconds before the new data appears in the Triggered Review window.


Odyssey - [Recording 2]
File Edit Config Control Display Window Help
Strain
Speed
10.00 mm/s
Gain
500.0
Acquisition
Replay
Available Space:
24%
Record Time
00029 0000041
491. µstr
-511. µstr
Strain
0:00:40.853 50.00 ms/div 0:00:41.131
0:00:36.781 1.000 s/div 0:00:42.344
For Help, press F1
1kS/s X=0:00:01.703 dX=-3.73s Y=2.54µstr dY=100nstr



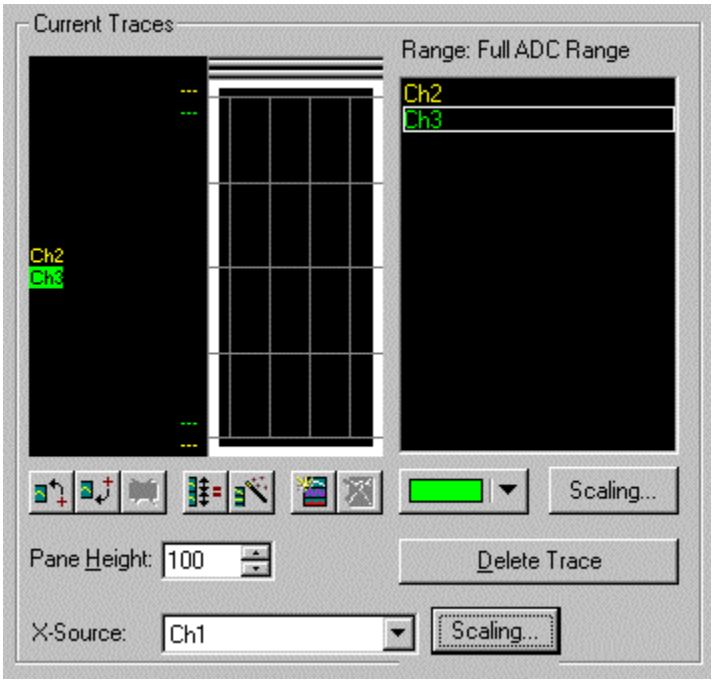
X-Y Display

The ***X-Y Display*** command splits the display horizontally and creates an X-Y window on the left side. This function is available when stopped or when reviewing and playing back previously recorded data.

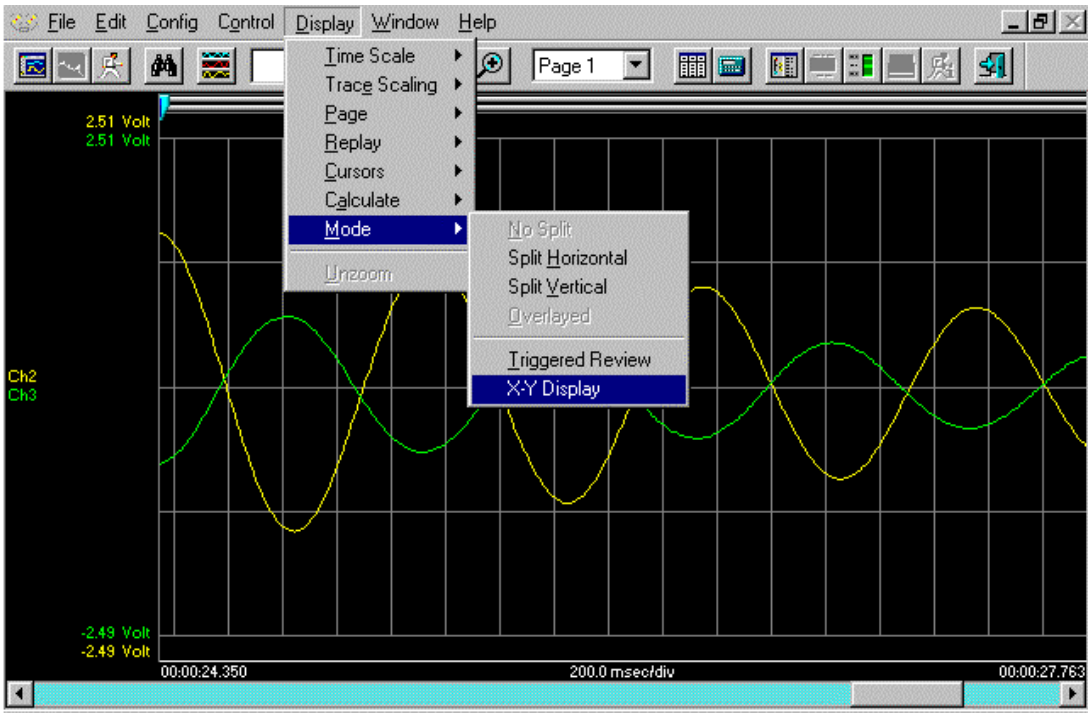
It can not display the live incoming signals in real time. X-Y Display mode is available only after a Recording is completed.

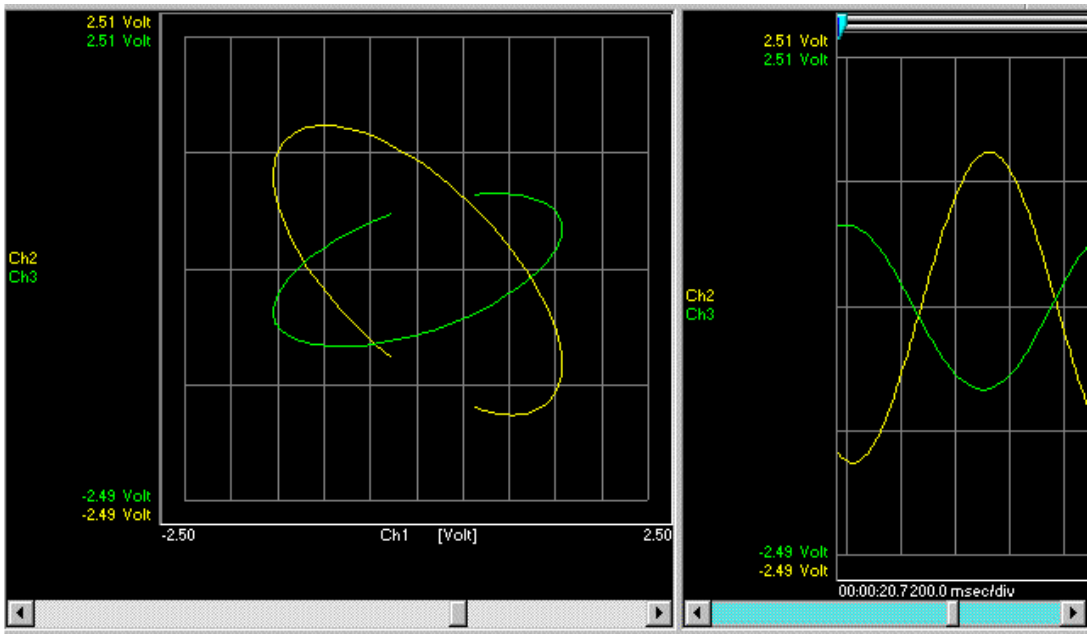
To compose an X-Y display for the currently displayed Recording:

1. Select the **X-Source** channel to be used for the X-axis in the ***Config…Display*** dialog as shown below. Only one signal may be used for the X-axis. The default is Channel 1.
2. The X-axis range will normally be the same as the X-Source channel's range. If you wish to select a different scale, click the **X-Scaling** button at the bottom of the dialog and enter the desired values.
3. If you are not already viewing the desired Y-axis channels, configure the channel(s) to be displayed in the **Current Traces** box. Any number of channels may be selected. In the example below, Ch2 and Ch3 will be displayed as a function of X-Source Ch1. Click OK when finished composing the display.



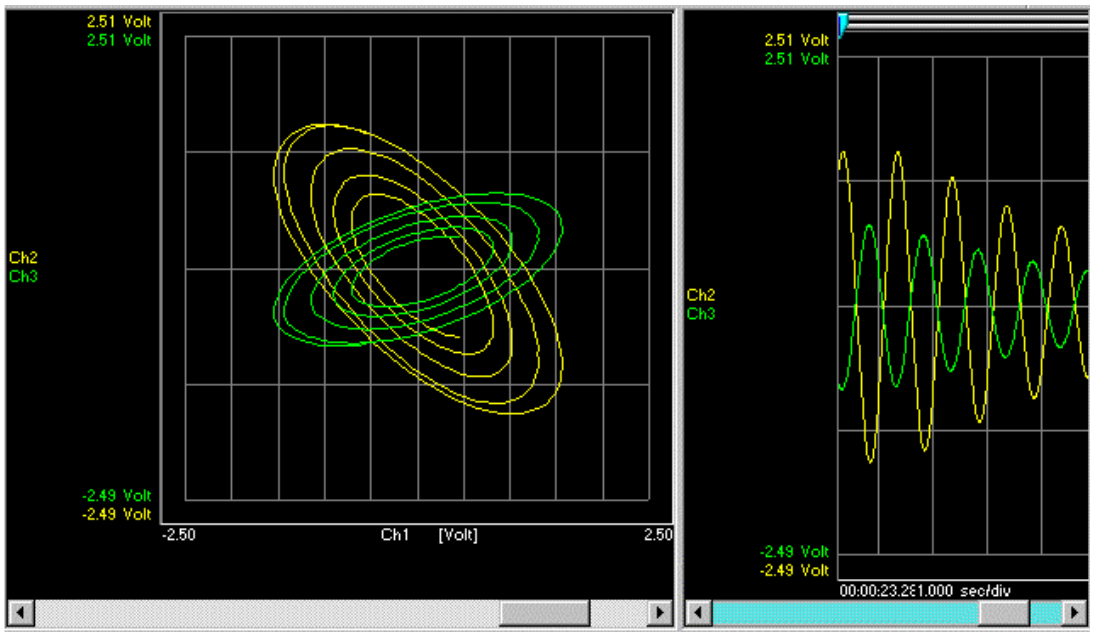
4. In the ***Display Mode*** menu, select ***X-Y Display*** as shown below. The display splits, with the Y/T data on the right and its X-Y representation on the left. The splitter bar between the panes may be moved by clicking it with the mouse in normal Windows fashion.
   Hint: To allow more room for the X/Y display, turn off the **Control Palette** display by selecting *Window…Control Palette* in the main menu.



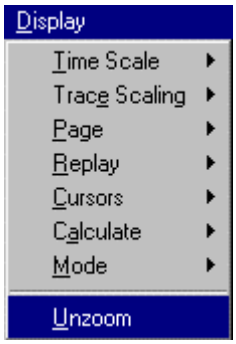


5. While in X/Y mode, you may use the Jog/Shuttle knob, Scroll bar and Time Scale Compress/Expand to change the portion of the Recording you are viewing. You may use the Configure Display and Trace Scaling commands to compose the display. Replay, Previous/Next Recording, zoom and printing are all available as in other modes. The example below shows the display after ***Compress Time Scale*** was used to view more data. The X-Y display will update to show that portion of the waveforms.

.



By toggling the **Display…Mode…XY Display** command, you may freely switch in and out of X/Y mode.



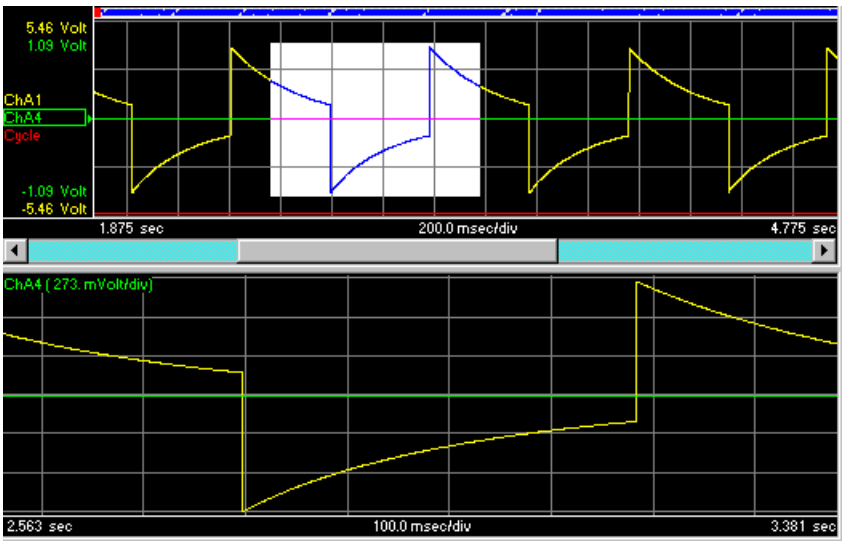
Unzoom

The ***Unzoom*** command closes the window that opens when you zoom in on an area of the display.

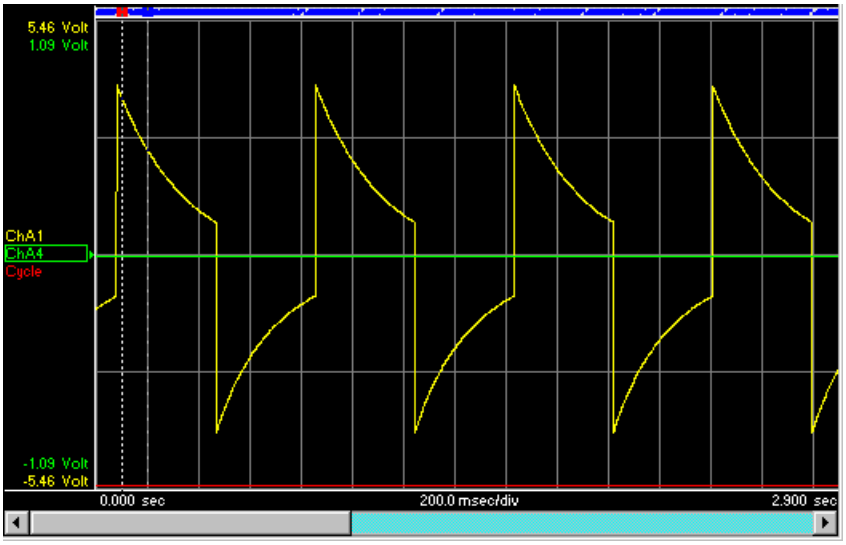
To zoom (enlarge) an area of the **Recorder Display**, simply click and drag over that area with the mouse. The display splits and the zoomed area is shown in the lower pane. Use the ***Unzoom*** command to return to the regular display.

Click and drag anywhere in the white zoom box to move the zoomed area. Click and drag anywhere outside the zoom box to create a new zoom box.

The following example shows the effect of the **Unzoom** command on the display.

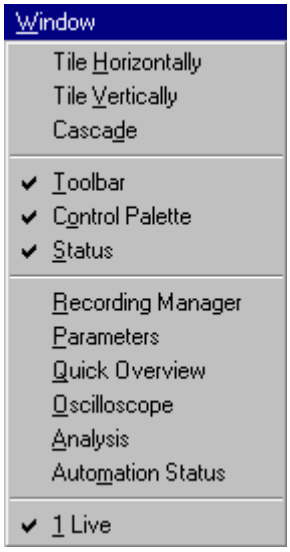


Recorder Display with zoomed area.



Same display after applying the ***Unzoom*** command.

Chapter 11:
Using the Window Menu

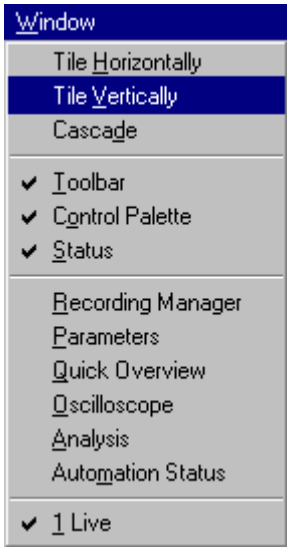


Window Menu

The ***Window*** menu contains commands that allow you to change the configuration of the windows, open other control options, use the ***Recording Manager***, switch to ProView or imPRESSion, and select any of the currently open recordings to view.

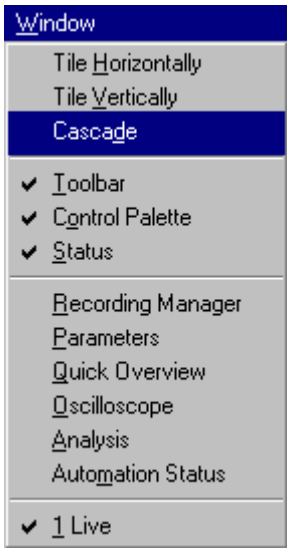
Tile Horizontally

The ***Tile Horizontally*** command is a standard Windows command that arranges all the open recording windows side-by-side. Any number of recordings can be opened for viewing at the same time.



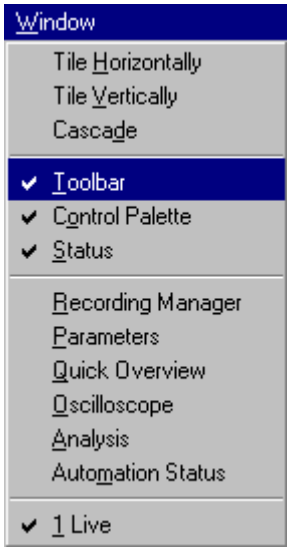
Tile Vertically

The ***Tile Vertically*** command is a standard Windows command that stacks all the open recording windows. Any number of recordings can be opened for viewing at the same time.



Cascade

The ***Cascade*** command is a standard Windows command that stacks all the open recording windows so that you can view the title bar of each window.

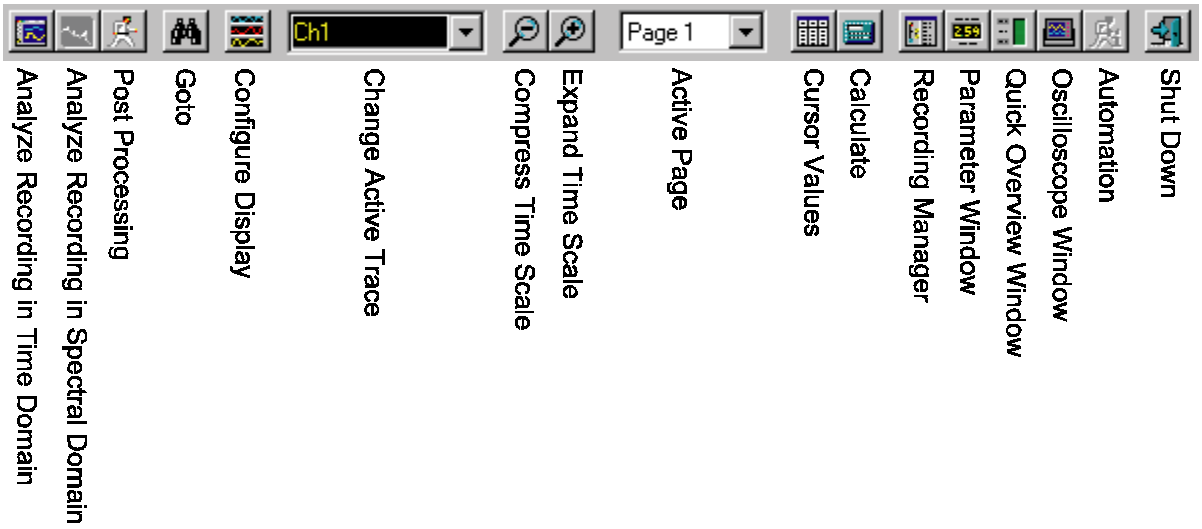


Toolbar

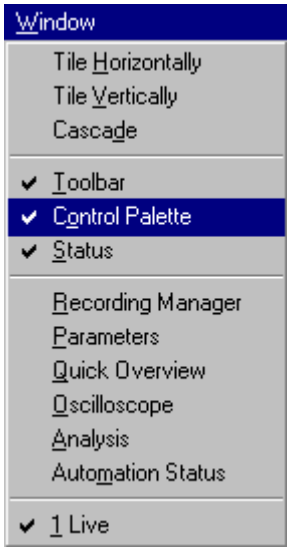
The ***Toolbar*** command toggles the toolbar on and off in the **Recorder Display**. A check mark by the ***Toolbar*** command indicates that the toolbar is currently displayed. Turning it off allows more room for the waveform display.

The **Toolbar** can be moved anywhere on the screen by clicking anywhere on its surface where an icon does not appear, and dragging it with the mouse.

The **Toolbar**:



For more details on using the toolbar, refer to Chapter 13.



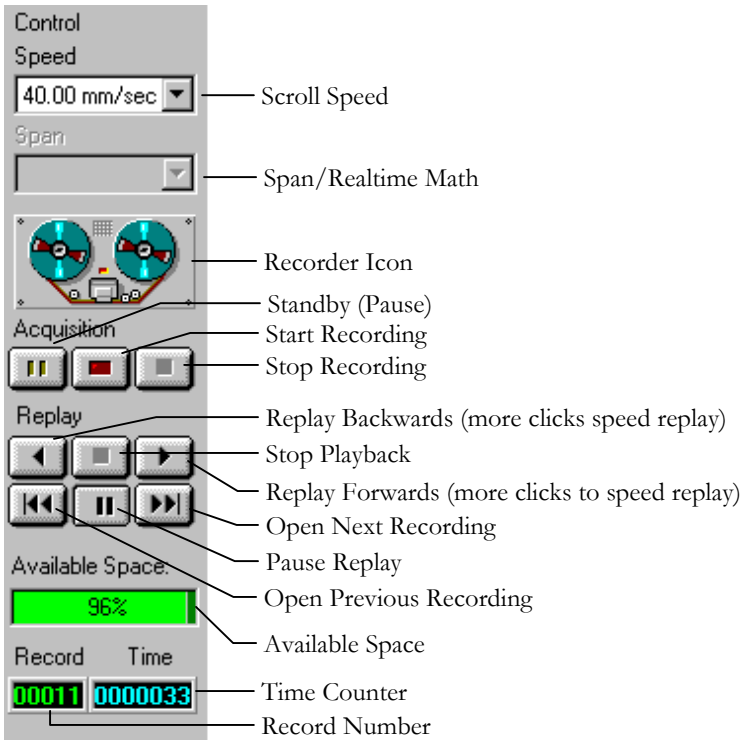
Control Palette

The ***Control Palette*** command toggles the **Control Palette** on and off in the **Recorder Display.** A check mark by the command indicates that the **Control Palette** is currently displayed.

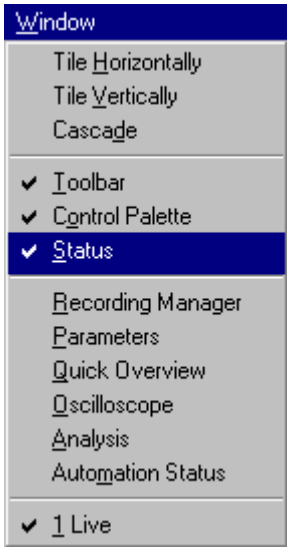
Turning it off allows more room for the waveform display.

The **Control Palette** can be moved anywhere on the screen by clicking on an empty area in the palette and dragging it with the mouse.

The **Control Palette**:



For more details on using the Control Palette, refer to Chapter 5, *Using the Control Palette.*

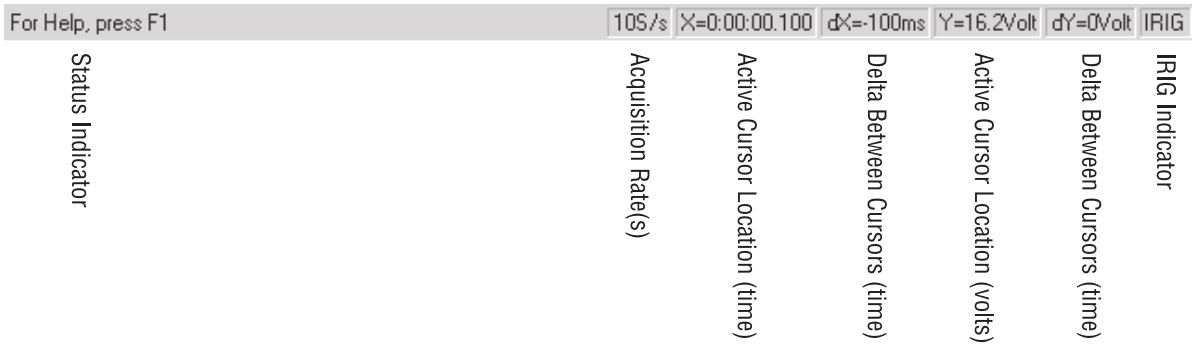


Status

The ***Status*** command toggles the **Status Bar** on and off in the **Recorder Display**. A check mark by the command indicates that the status bar is currently displayed.

Turning it off allows more room for the waveform display.

The **Status Bar**:



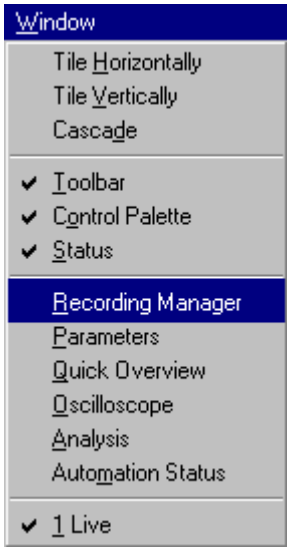
If you point the mouse at the Status Bar **dX** (Delta between Cursors) readout, a Tool Tip appears reporting the number of samples on the selected channel between the cursors.

The IRIG indicator in the right corner shows the status of the optional IRIG or GPS timecode card. The color indicates the current operating condition:

Gray: No IRIG/GPS card is installed. The Odyssey is using its own internal timebase, and time-of-day information comes from the PC's clock.

Red: The IRIG/GPS card is installed but no timecode signal is being recognized. The card is "flywheeling" with a very-low-drift crystal oscillator and updating the last known time with a precision onboard clock. Note that the GPS receiver may require up to 20 minutes after power-up to locate and track sufficient satellites to provide maximum accuracy.

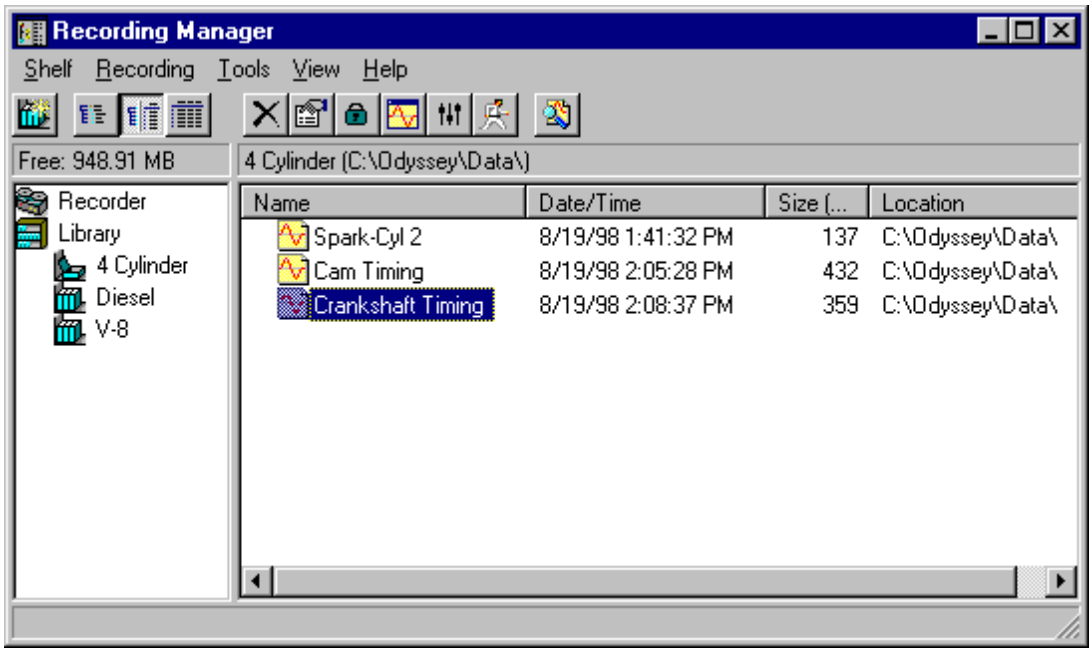
Green: The IRIG/GPS card is tracking a timecode signal. The Odyssey is using the precision IRIG/GPS timebase for both time-of-day and for acquisition. The digitizer clocks are derived directly from the timecode input.



Recording Manager

The ***Recording Manager*** command opens a dialog that allows you to organize your recordings.

 This menu command has the same effect as the **Recording Manager** tool command in the **Toolbar**.



The **Recording Manager** dialog allows you to organize, view and copy your recordings. The left side of the dialog lists the storage areas available and the amount of free space still available. The **Recorder** is the area where recent recordings are stored until you delete them. It refers to Odyssey's acquisition disks, which are not directly accessible in Windows. The Recorder can hold a maximum of 511 recordings. The **Library** contains **Shelves** where you place recordings that you want to save. **Shelves** refer to directories and subdirectories you create on Windows disks, whether internal, external, or networked. Each shelf can point to a different storage area, but they all appear in the **Library** where you can easily find your recordings. A shelf can hold any number of recordings.

When you click on the **Recorder** or one of the **Shelves**, a list of the recordings and information about each recording stored in that area appears on the right side of the dialog.

When you open a shelf, the icon for the shelf changes and the name of the shelf appears in the area above the list of recordings. This line also displays the Windows directory where the shelf is located. In the example above, the 4-Cylinder shelf is open and the recordings stored there are listed on the right.

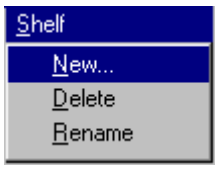
To copy a recording from one area to another:

1. Find the recording you want to copy by clicking on the appropriate area and finding the recording name in the directory list. In standard Windows practice, you may hold down the **Shift** key to select multiple files for copying. Hold down the **Control** key while clicking to select non-adjacent files. Or you may click and drag the mouse to select all files inside the rectangle you draw.
2. Using the mouse, click on the recording name and drag it to the shelf where you want to store a copy. The mouse cursor changes to ⃠ until you position it over a shelf name where the recording can be copied. The cursor then changes to . When the cursor changes to the page icon, release the mouse button.
3. A prompt appears allowing you to choose whether to copy the recording.

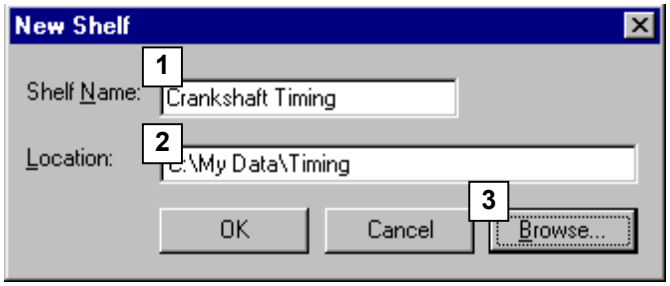
Click **Yes** to copy the recording or **No** to exit without copying the recording. A dialog box appears to indicate the progress of the copying operation.

Shelf Menu

The menus and toolbar at the top of the Recording Manager dialog allow you to further organize your recordings.



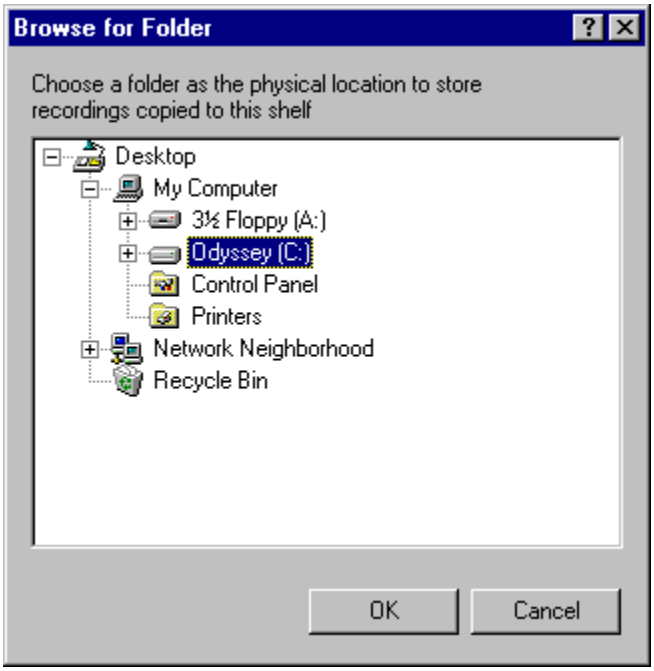
The ***New*** command opens a dialog that allows you to create a new shelf in the library.



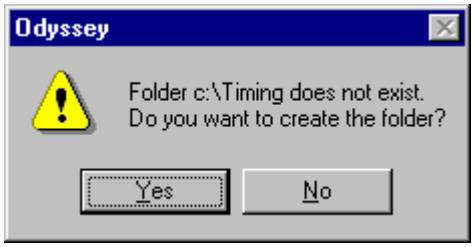
To create a new shelf:

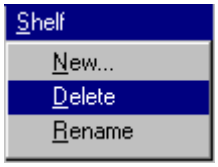
1. Enter a name for the shelf (**1**). Like a Windows file name, the name can contain any alphabetic or numeric characters, including spaces. The name cannot contain Windows reserved characters such as **:**, *****, **/**, ****, **?**, **"**, **<**, **>**, **|**, or **.** .

2. Enter a location for the shelf file (**2**) or use the **Browse** button (**3**) to choose a folder in which to store the recordings. The shelf can be located on any PC or network storage device.



3. Click **OK** to exit the dialog and create the new shelf or click **Cancel** to exit the dialog without creating a new shelf. The Shelf is saved as a standard Windows Shortcut.
4. If you did not use the browse option and you entered a non-existent path, the following dialog appears, asking you to whether to create a new folder. Click **Yes** to create a new folder or **No** to exit the dialog and enter a new path or browse your drive.

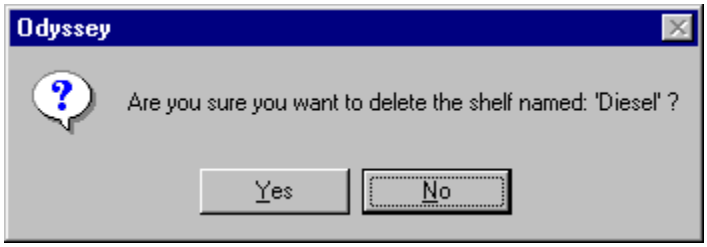




The ***Delete*** command opens a dialog that allows you to delete the currently open Shelf from the list of Shelves. It deletes only the Windows Shortcut that Odyssey uses to locate Shelves. The actual Windows directory and the files it contains are not affected.

To delete a shelf:

1. Select the shelf to delete in the **Recording Manager** dialog.
2. Select the **Delete** command.
3. A dialog appears that allows you to decide whether to delete the shelf.



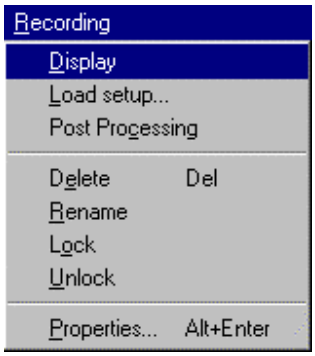
4. Click **Yes** to exit the dialog and delete the shelf or click **No** to exit the dialog without deleting the shelf. As a precaution against inadvertent erasure, deleting a shelf removes it from the Odyssey Recording Manager display only. To remove the recordings, select the files and delete them BEFORE deleting the shelf.

The ***Rename*** command allows you to change a shelf name.

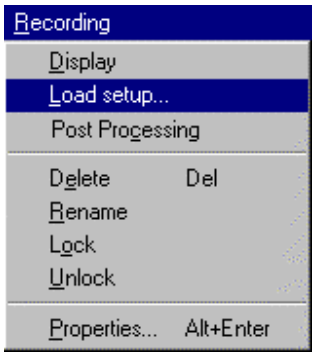
To rename a shelf:

1. Click on a shelf to select it in the Recording Manager dialog.
2. Select the **Rename** command.
3. The shelf name is activated and a blinking cursor appears, allowing you to change the name of the shelf by typing a new name.

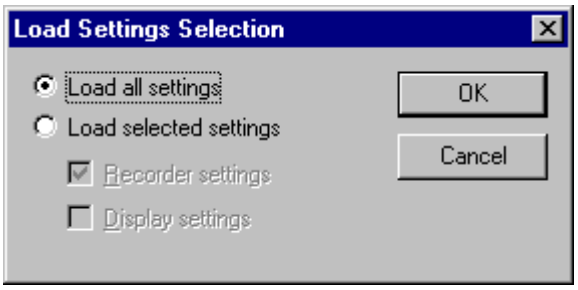
Recording Menu



The ***Display*** command opens the currently selected recording in the **Recorder Display** and exits the **Recording Manager** dialog**.**

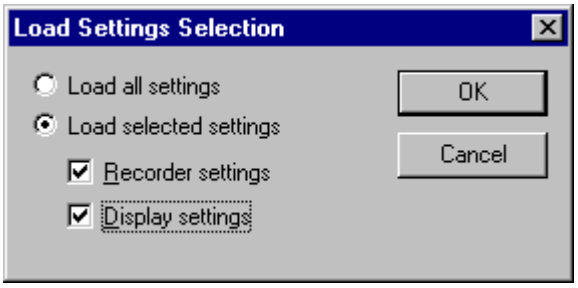


The ***Load Setup*** command opens a dialog that allows you to select which settings to load. You can load settings from any previous recording to make further tests with the same settings.



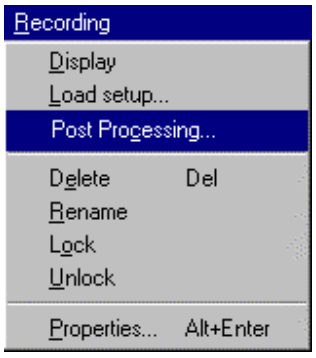
To load both the recorder and display settings from the currently selected recording:

1. Click **Load all settings**.
2. Click **OK** to exit the dialog and load the settings or click **Cancel** to exit the dialog without changing the current settings.



To load selected settings:

1. Click **Load selected settings** and select either **Recorder settings**, **Display settings** or both.
   Recorder settings include all acquisition, signal conditioner, channel, trigger, alarm and automation settings.
   Display settings include only the composition of the display pages.
2. Click **OK** to exit the dialog and load the settings or click **Cancel** to exit the dialog without changing the current settings.

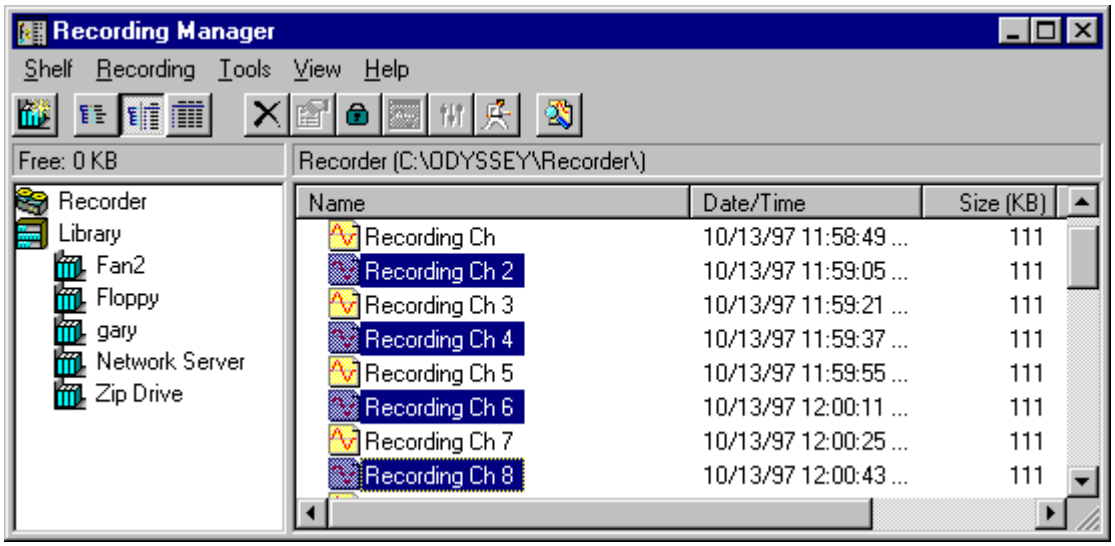


The ***Post Processing*** command opens a dialog to control Odyssey's powerful automation abilities. These convenient features allow you to choose from an array of actions to be automatically performed on a recording or on multiple recordings. With a few clicks, you can set the Odyssey to automate many common actions:

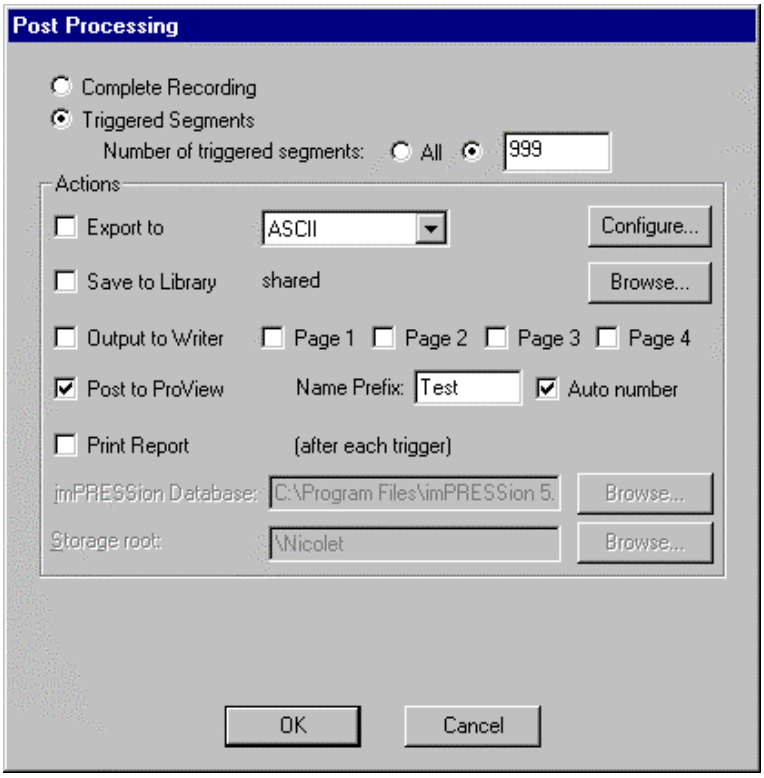
- Copy selected recordings to a file server on your network,
- Export a number of recordings in any of more than a dozen formats, or
- Plot or Analyze each Trigger event during a long recording.

To start a Post Processing action:

1. Select the recording or recordings you would like to act upon. The files can be located on the **Recorder** or on any **Library Shelf**. Click on any recording to select it, or select multiple files to process with standard Windows techniques. To select a number of adjacent files, click on the first recording, then hold the keyboard **Shift** key and click on the last recording. To select non-adjacent files, click on the first recording, then hold the keyboard **Control** key and click on each desired recording in turn. An example using the **Control** key is shown here.



2. After selecting the files to operate upon, use the **Post Processing** menu command to select the required options.



3. Select the part of the recording to analyze. You can choose to analyze:

- **Complete Recording**. Post, store or plot the entire length of the selected Recording(s). A new file or plot will be generated for each recording. Each one contains all data from all channels. **Note**: Since the Odyssey can make huge recordings of thousands of Megabytes, use this option with care if you have a long-duration recording at high sample rates! Most versions of Windows are limited to 2GB file size. Copying large recordings may consume many minutes or hours, depending on the speed of your storage device.
- **Triggered Segments**: Post, store or plot only the triggered segments within the selected Recording(s). Each triggered segment will be processed individually, including the pre-trigger and post-trigger data. An individual file or plot will be generated for each triggered segment. Data recorded between triggers will be ignored by the automated actions, saving storage space and time. To use the Triggered Segments option, each of the selected Recording(s) must contain at least one triggered segment.
  In the **Number of triggered segments**, you may select **All** to act on every trigger in the recording, or enter a number to act on the first "n" number of triggers only. If you are post processing ten recordings and you select five triggers, the result will be 50 files or plots.

Note: *A **Triggered Segment** contains pre- and post-trigger data and may be of any length. It includes the number of pre-trigger samples you specify, all samples recorded for as long as the trigger condition is true, and the specified number of post-trigger samples after the trigger condition goes false. If another trigger signal was detected before the post-trigger time elapses, the segment also contains the additional triggered data and additional post-trigger data.*

4. Select the desired **Actions** to perform on the recording.

   You can select any or all of the options for automatic actions.

   - **Export to**: Export data for use with other analysis programs such as SpectraPro, MatLab or DADiSP. Select the type of export format from the pull-down menu. Each Recording or segment will generate a new file. (Some export formats allow only a single channel per file, and generate up to 32 files for each recording or segment.) Click on the **Configure** button to select the appropriate options for each export type such as file names and directories.

   - **Save to Library**: Save the recording or segments to a **Library Shelf** which can be a Windows directory anywhere on your PC or network. Click the **Browse…** button to select from existing **Shelves**. To create a new shelf, use the **New Shelf** command in the Odyssey ***Recording Manager*** (see the *Recording Manager* section in Chapter 11).

   - **Output to Writer**: Click this button to automatically plot the recording or segments to the currently selected printer or stripchart writer. Click on the checkboxes for Pages 1-4 to indicate which display pages to print. To select printers, change writing speed, etc., refer to the ***Config…Writer*** section in Chapter 8.

   - **Post to ProView**: This option is not available if ProView is not installed on your Odyssey. Posts data from the recording or segment to the optional ProView analysis software. The recording name, length, sample rate, and other information is also provided to ProView. If desired, enter a **Name Prefix** of up to six characters to identify different data sets in ProView. Similar to a spreadsheet template, ProView recalculates its formulas each time new data is posted. Also similar to a spreadsheet, the ProView View, analysis formulas, and Report template must be set up in advance of the automated posting.
     If the **Auto number** checkbox is off, each posting will overwrite the previous one, so the last one processed is always available for quick inspection. Waveforms carry the same name with each posting, so each formula you define is recomputed with the new data. This option must be selected to allow automated analysis of different segments.
     If you click the **Auto number** checkbox, each new data set is added to the ProView Data Pool with a unique name. You can then define additional views and analyses of the various data sets. Note that, since each new data set is assigned a unique incrementing name, your predefined ProView formulas will not act on the new data.

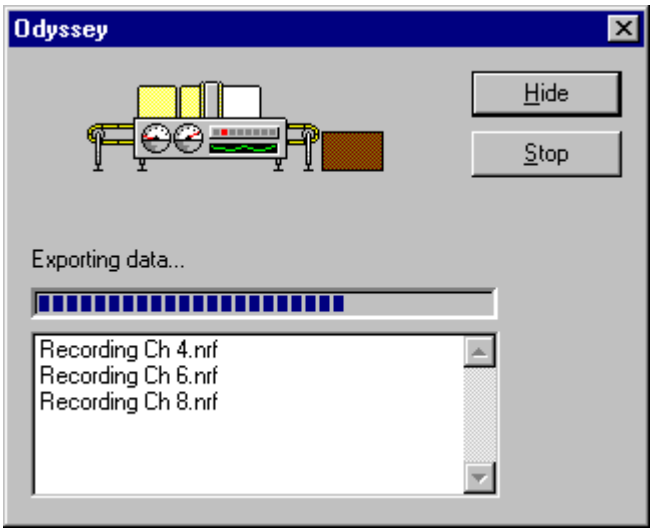
   - **Post to imPRESSion:** If you have selected imPRESSion as your post-processing software, the dialog will include this option rather than the Post to ProView. Operation is similar to ProView, but additional fields are provided to specify the imPRESSion database and (optional) storage root folder to use. The imPRESSion database may be on your local PC or anywhere on your network. imPRESSion software need not be installed on your Odyssey.
     If you post a number of triggers using the Autonumber feature, your imPRESSion formulas and report layouts may be used on any of them by making their folder the Active Folder.

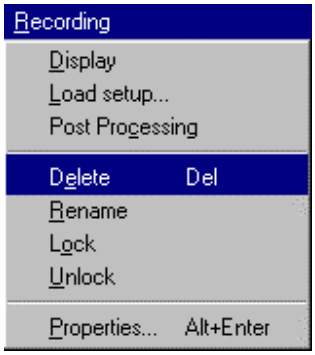
   - **Print Report**: Analyze the waveforms and print a report after posting. This lets you produce fully annotated reports from each recording or triggered segment with a template

you define, a great convenience for repetitive testing such as Quality Assurance, Manufacturing, and Failure Analysis applications. This option is available only when **Post to ProView** or **imPRESSion** is selected. The Report template must also be defined in advance of using the automated **Post Processing**, and the auto numbering feature must be off.

5. Click the **OK** button to begin post processing, or the **Cancel** button to exit without processing.

   While the post processing actions are taking place, you will see a message box informing you of the progress. The multi-tasking Windows environment lets the automation take place while you analyze data or work in other applications. You can hide the status box by clicking the **Hide** button, or stop the automation in process by clicking **Stop**. To view the status box again after hiding it, click the **Automation Status** button on the right side of the Odyssey Toolbar.

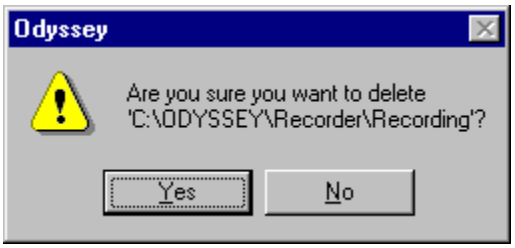




The ***Delete*** command opens a dialog that allows you to delete recordings. Be sure you have stored any valuable data to Windows storage before deleting files from the **Recorder**.

To delete recordings:

1. Select a recording (or several recordings by holding the **Shift** or **Control** key) to delete in the **Recording Manager** dialog.
2. Select the **Delete** command, or press the keyboard **Delete** key.
3. A dialog appears that allows you to decide whether to delete the recording.



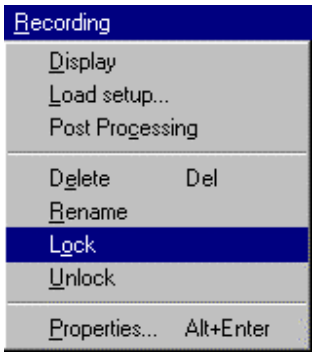
4. Click **Yes** to exit the dialog and delete the recording or click **No** to exit the dialog without deleting the recording.

Note: *When deleting files, the Odyssey* ***Recorder*** *behaves like a tape recorder. To make disk space available, files should be deleted in reverse order of recording. That is, Recording 10 must be deleted before Recording 9 or at the same time. If Recording 10 remains in place, the next recording will begin after it even though Recordings 1 through 9 were deleted. To maintain Odyssey's high real-time recording rate, no disk fragmentation is allowed.* ***Library Shelves*** *refer to conventional PC storage, where files can be freely copied, deleted, and moved in any order.*

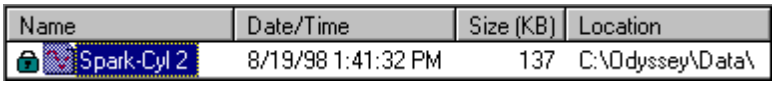
The ***Rename*** command allows you to change a recording name.

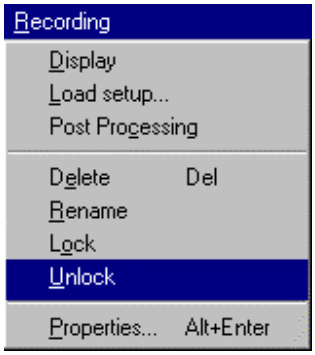
To rename a recording:

1. Click on a recording to select it in the **Recording Manager** dialog.
2. Select the **Rename** command.
3. The recording name is activated and a blinking cursor appears, allowing you to change the name of the recording by typing a new name.

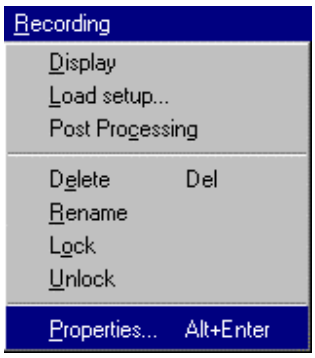


The ***Lock*** command allows you to lock a recording in either the **Recorder** or **Library** so that it cannot be deleted. A locked recording is indicated by a lock icon beside the recording name. In a Library Shelf, the file is marked with the Windows Read-Only attribute so that a warning is presented before it is possible to delete it.

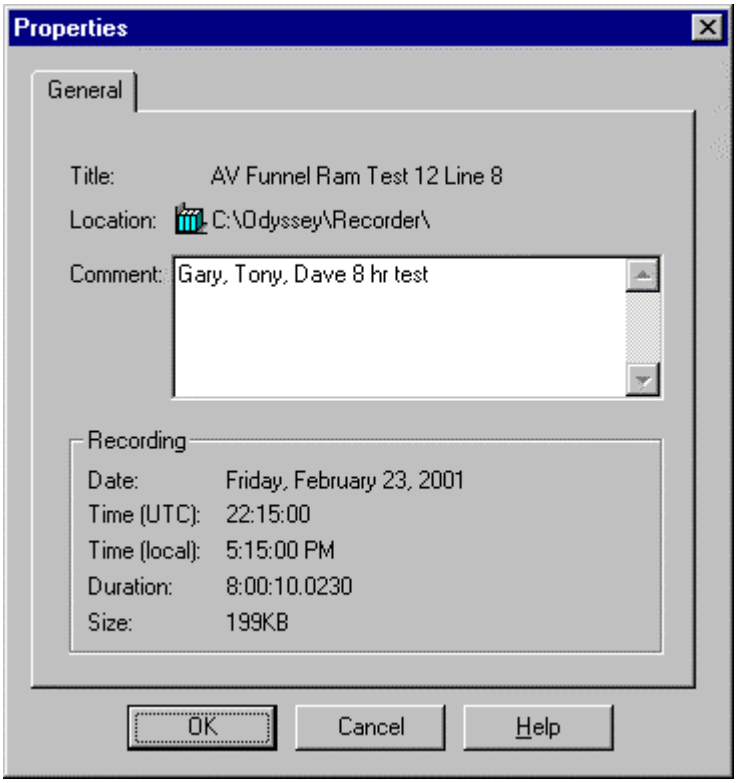




The ***Unlock*** command allows you to unlock a locked recording so that it can be deleted.

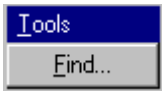


The ***Properties*** command opens a dialog with information about the recording and a place for you to enter comments to be stored with the recording.

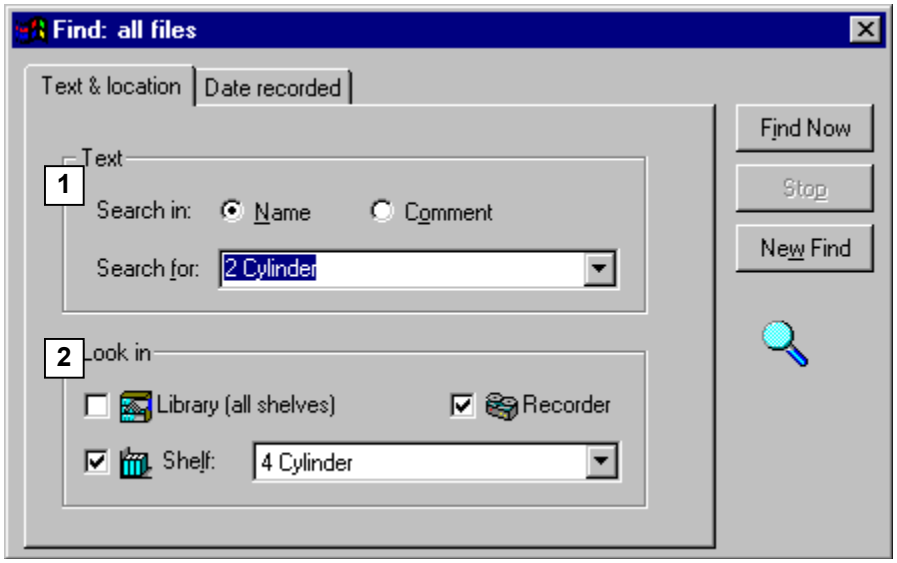


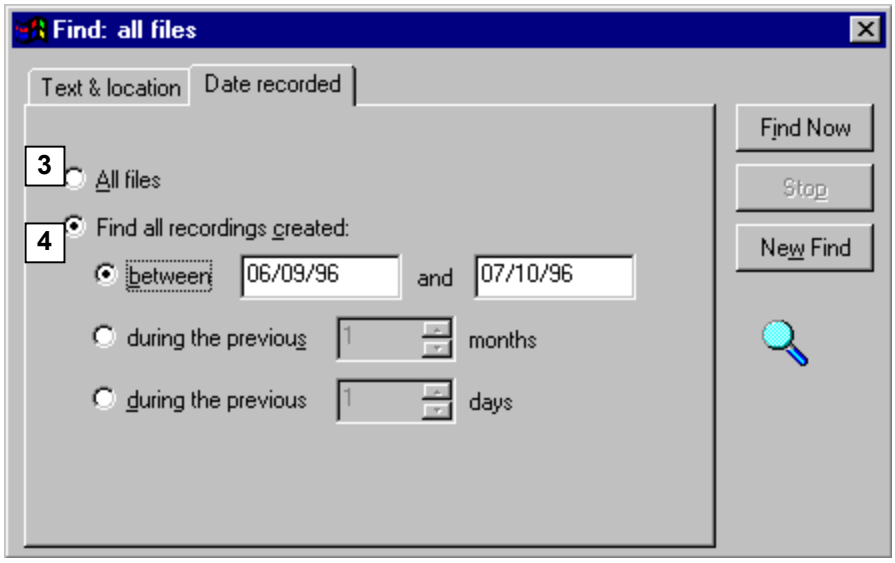
The Properties dialog contains information about the currently selected recording. It includes the title of the recording and any comments you entered in the **Acquisition** tab of the **Recorder Configuration** dialog prior to recording. You can edit or add to your comments in this dialog after recording. Enter comments you want to store with the recording in the **Comment** area.

Tools Menu



The ***Find*** command opens a dialog that allows you to search for a recording.





You can search for a recording by:

- Text in a recording name or comments (**1**)
- Looking in a specific location, such as the library, the recorder, or a specific shelf (**2**)
- Any date (**3**)
- The date the recording was made (**4**)

To set up the search for text:

1. Click on either **Name** or **Comment**.
2. Enter the text to use for the search. You can enter a name, any part of a name, or part of a comment entered for the recording. If the characters exist anywhere in a file name or comment, the **Find** function locates them.

To set up the search area:

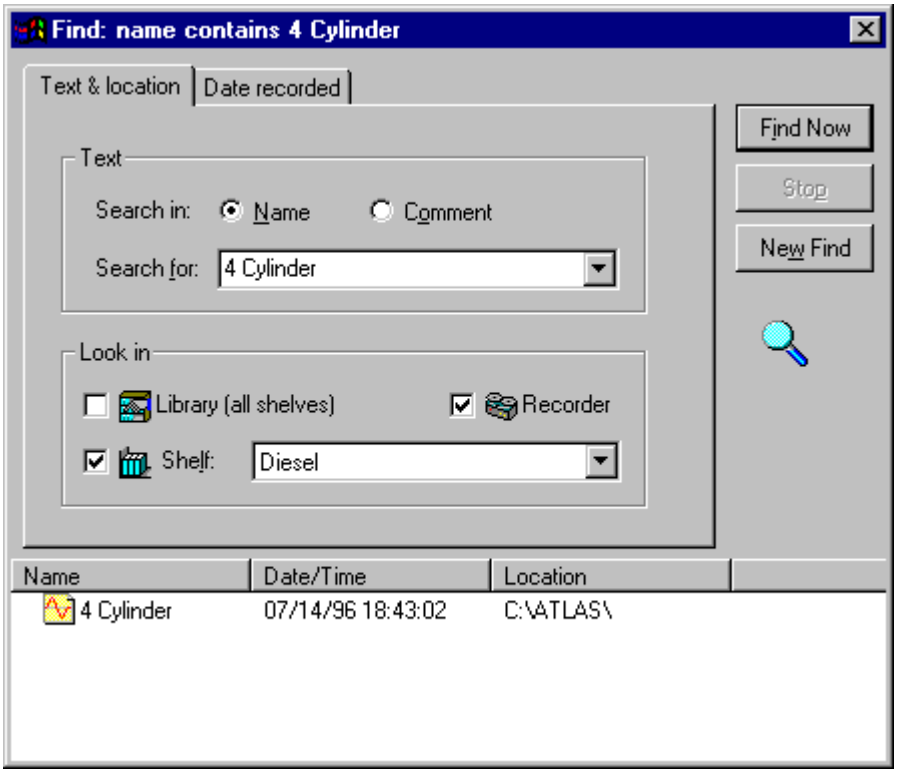
1. Click on either **Library, Recorder** or **Shelf**.
2. If you select **Shelf**, select a shelf to search from the drop down menu.

To select dates to search:

1. Click on the **Date recorded** tab.
2. Click **All files** to search for files created on any date.
3. Click **Find all recordings** created to search for files created in a select time period.
4. Enter either a specific range of dates to search, a range of months (use the up and down arrow buttons to change the range), or a range of days (use the up and down arrow buttons to change the range).

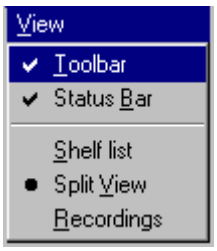
To initiate the search:

1. Click **Find** to begin the search. Records found in the search appear below the dialog.



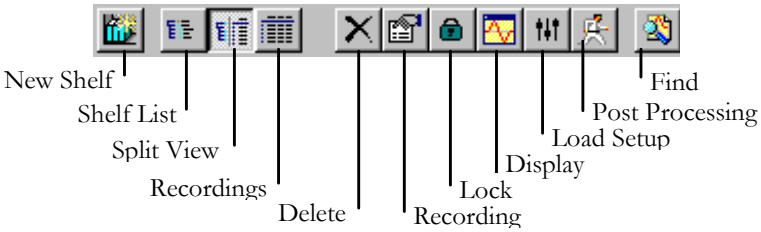
2. If you want to cancel the search before it is complete, click **Stop**. The records found up to that point appear below the dialog. You can easily copy the recording to a **Shelf** in the **Library** by clicking and dragging the found recording from the "found" list to the target **Shelf**. You can also drag it to the **Recorder Display** to view it.
3. If you want to try again with new text, click **New Find** to clear the dialog.
4. Click on ☒ in the upper right corner of the dialog to exit.

View Menu

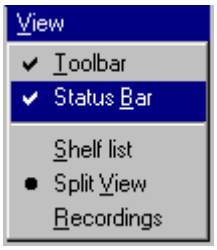


The ***Toolbar*** command toggles the **Recording Manager** toolbar on and off. A check mark by the ***Toolbar*** command indicates that the toolbar is currently displayed.

The **Recording Manager** toolbar:

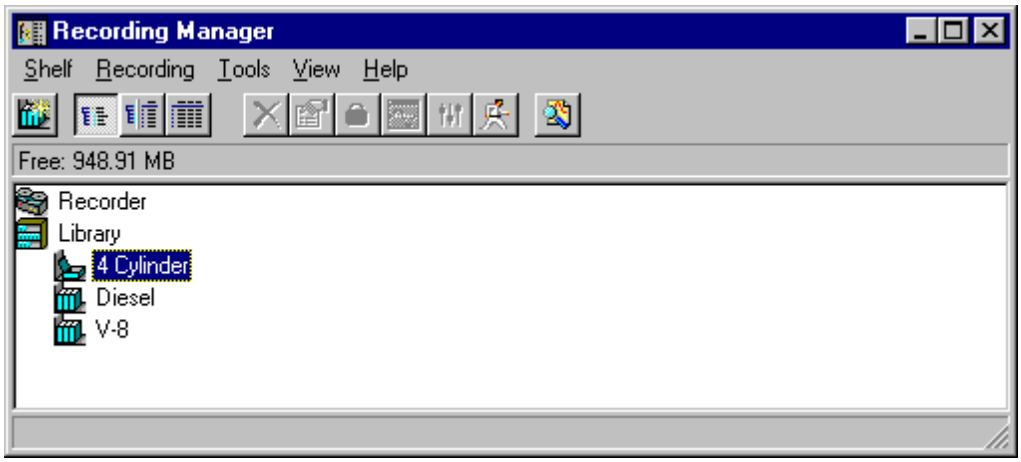


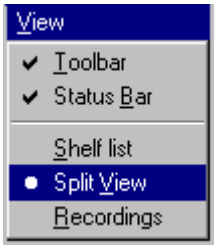
A description of each button appears a few pages later in this section. They have the same effect as their menu equivalents.



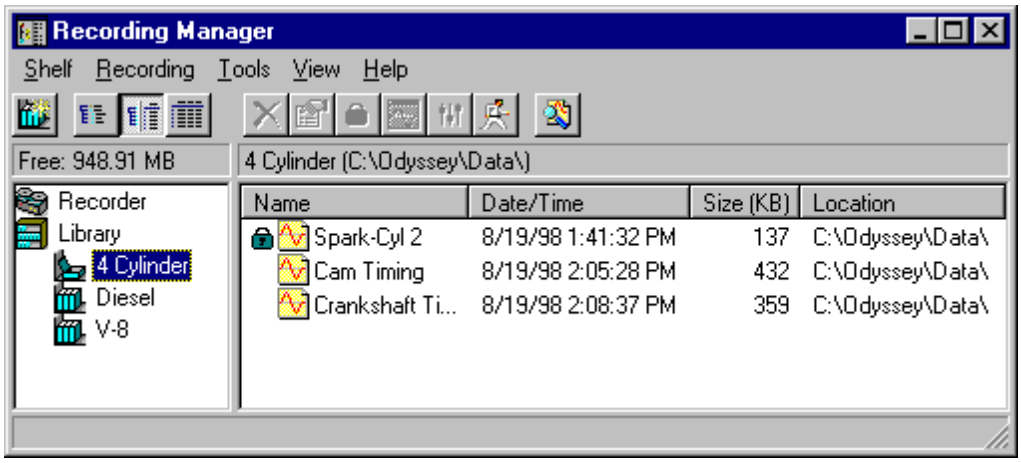
The ***Status Bar*** command toggles the status bar on and off in the **Recording Manager** dialog. A check mark by the ***Status Bar*** command indicates that the status bar is currently displayed.

The ***Shelf list*** command changes the **Recording Manager** display to show only the shelf list. An example is shown below.





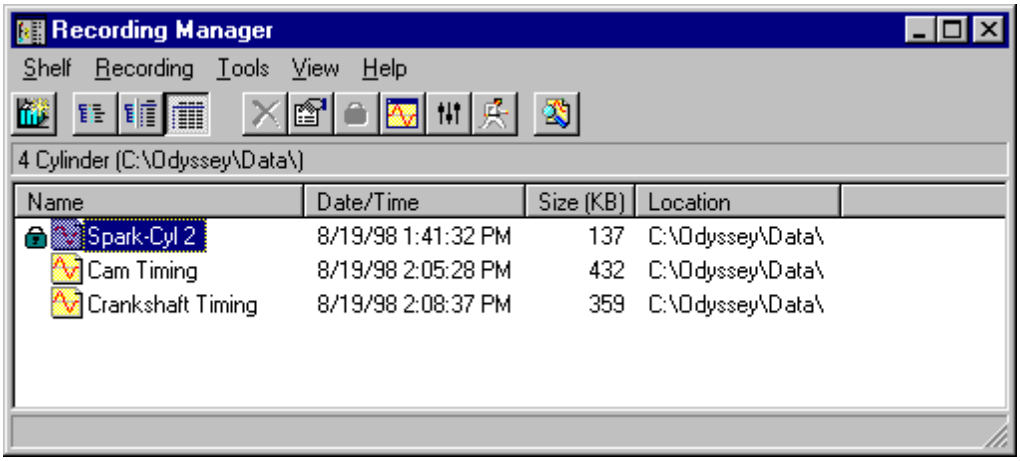
The ***Split View*** command changes the **Recording Manager** display to show both the shelf list and recordings. An example is shown below.



Change the width of the two main areas by clicking on the bar between the two areas and dragging it.

Change the width of the columns in the list of recordings by clicking on the vertical line between the headings and dragging the column to the required width.

The ***Recordings*** command changes the **Recording Manager** display to show only the list of recordings. An example is shown below.



Change the width of the columns in the list of recordings by clicking on the vertical line between the headings and dragging the column to the width you want.

Help Menu

The ***Contents*** command opens the Odyssey help system to the **Contents** tab, allowing you to select a help topic.

The **Toolbar** in the **Recording Manager** dialog contains tools that allow you to quickly access commands without opening the menus.

The ***New Shelf*** tool command opens a dialog that allows you to create a new shelf in the library.

The ***Shelf List*** tool command changes the **Recording Manager** display to show only the shelf list.

The ***Split View*** tool command changes the **Recording Manager** display to show both the shelf list and recordings.

The ***Recordings*** tool command changes the **Recording Manager** display to show only the list of recordings.

The ***Delete*** tool command opens a dialog that allows you to delete recordings.

The ***Recording Properties*** tool command opens a dialog with information about the recording and a place for you to enter comments to be stored with the recording.

The ***Lock*** tool command allows you to lock a recording so that it cannot be deleted.

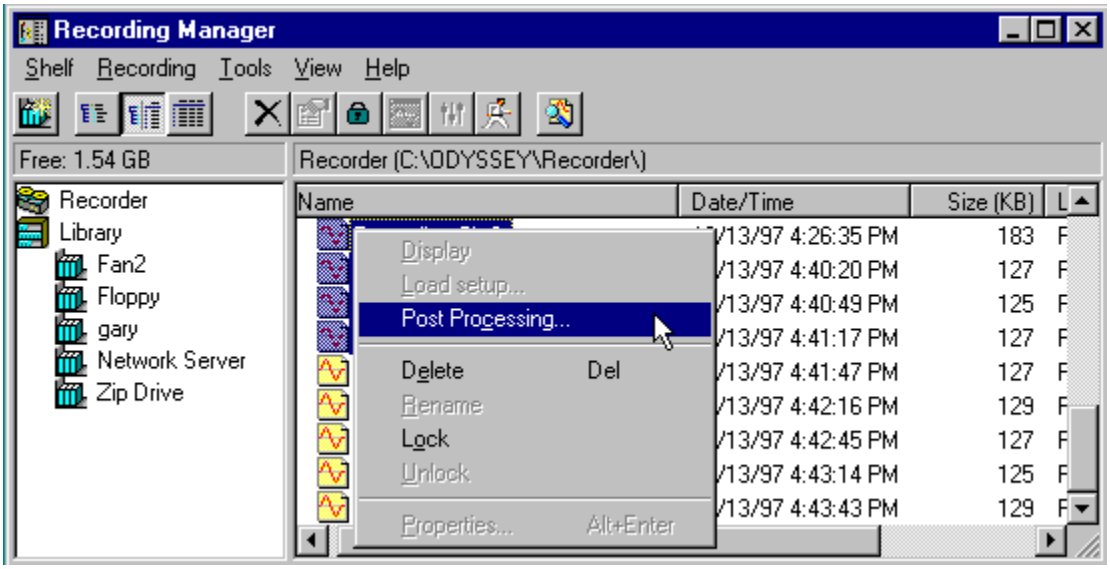
The ***Display*** tool command exits the **Recording Manager** dialog and opens the currently selected recording in the **Recorder Display**.

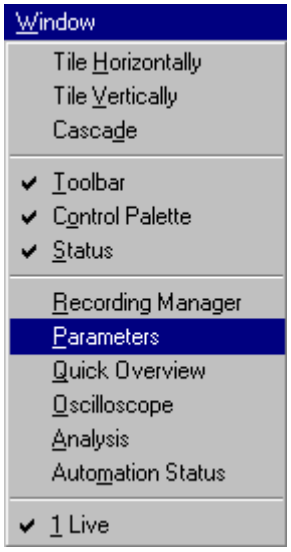
The ***Load Setup*** tool command opens a dialog that allows you to select setup settings to load.

The ***Post Processing*** tool command opens a dialog that allows you to select post processing setup parameters.

The ***Find*** command opens a dialog that allows you to search for a recording.

In addition to the Toolbar, several of the most frequently-used **Recording Manager** commands are available in a handy right-mouse context menu. Select any recording(s) in the file listing, then click the right mouse button for instant access to commands.



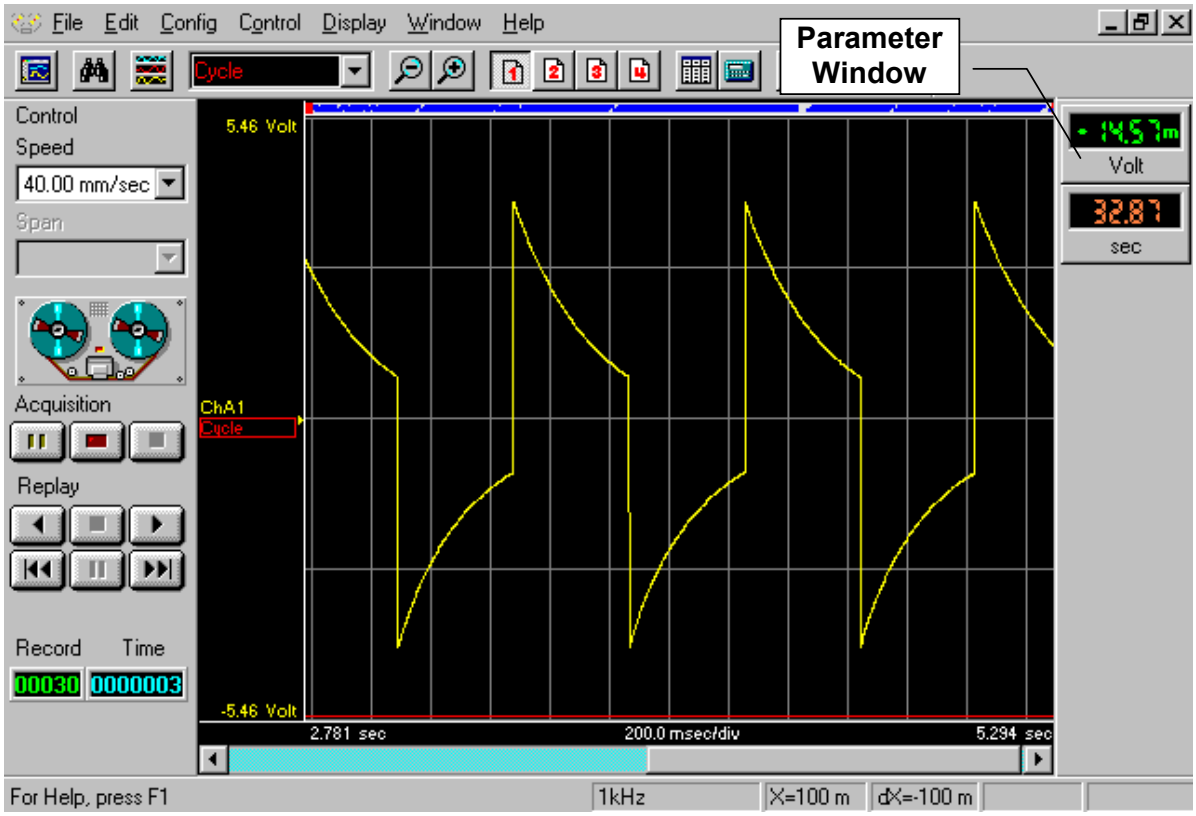


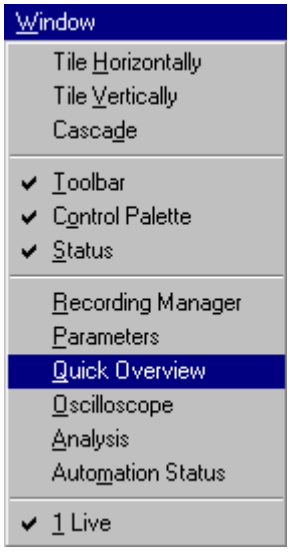
Parameters

The ***Parameters*** command toggles display of the parameters panel in the **Recorder Display**.

 This menu command has the same effect as the **Parameters** tool command in the **Toolbar**.

In order to display the parameter windows in the far right panel, as shown below, you must first establish parameters and then configure the parameter windows. Refer to the *Config…Channels* and *Parameters* section in Chapter 8 to learn how to set up the parameters.





Quick Overview

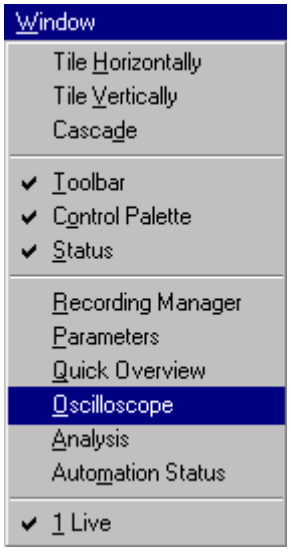
The ***Quick Overview*** command opens a window containing VU-meter style displays for all analog inputs and LED-style indicators for digital inputs. Updated a few times a second, the overview informs you at a glance of current input levels.


This menu command has the same effect as the **Quick Overview** tool command in the **Toolbar**.

In Channel 1's bargraph below, the solid bar in the center indicates the current signal level. The upper and lower lines are a peak hold showing the maximum signal excursion over the past 10 seconds. Channel 9 is currently off-scale and is displayed in red color. The mouse pointer is positioned over Channel 3, displaying a "tool tip" containing the current input value.

If any channel exceeds full scale at any time during a Recording, it turns red in color to indicate the overrange condition. About 10 seconds after the overrange occurred, the meter is latched to a yellow color. The meter will stay yellow as a warning until the next Recording is made.

In addition to the metering and status features, the Overview window provides quick access to the input controls. Double-click the mouse on a display to immediately access the Signal Conditioner dialog. Click the right mouse button on any Channel's display for a choice of Signal Conditioner or Channel controls.



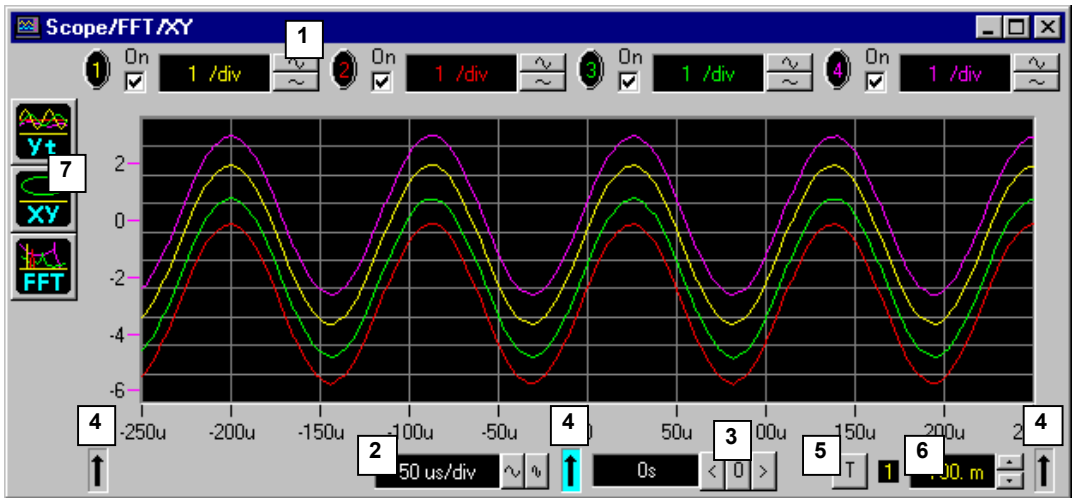
Oscilloscope (OD-200 Only)

The **Oscilloscope** command opens an oscilloscope-style display window to allow more convenient viewing of fast signals. Real-time X-Y and FFT functions are also available. The high speed OD-200 acquisition board includes the processing for this display.

If this menu command and its Toolbar icon are grayed out, your system is not equipped with OD-200 cards.

This menu command has the same effect as the **Oscilloscope Window** tool in the **Toolbar**.

The Oscilloscope window appears as shown below. It can display four channels at a time with a higher speed per division than the stripchart display. New data is displayed whenever the Odyssey is in Pause or Record mode. (Since unlimited zoom expansion is available during playback, the Oscilloscope window is not needed for replay.) A software trigger is provided to stabilize the display when viewing continuous signals.



Individual controls for each **Channel** (1) allow you to select the amplitude and enable/disable each trace. Click the mouse on a trace and drag it to move up or down on the screen. The numerics at the left edge reflect the new position. The settings you make affect only the Oscilloscope display: they have no effect on the input amplifier settings.

The **Timebase** control (2) provides a wide range of time per division settings similar to a conventional oscilloscope.

The **Trigger Position control** (3) moves the zero time indicator to the left or right. Click on the central "0" button to return the trigger position to the center. The default condition places the trigger at screen center, with 50% pre-trigger. You may click on the Left, Center or Right **Trigger Position arrows** (4) to trigger at the left edge, at the right edge (100% pretrigger) or at mid-screen.

The **Trigger Selector** (5) determines which channel provides a software trigger to stabilize the display. The **Trigger Level** control (6) moves the trigger threshold up or down to select a stable level. These setting affect the Oscilloscope display only: they have no effect on the Recording's Trigger settings.

The **Mode Selector** buttons (7) provide a choice of the normal Y/T (amplitude versus time) display, an X/Y display, or an FFT spectral display.

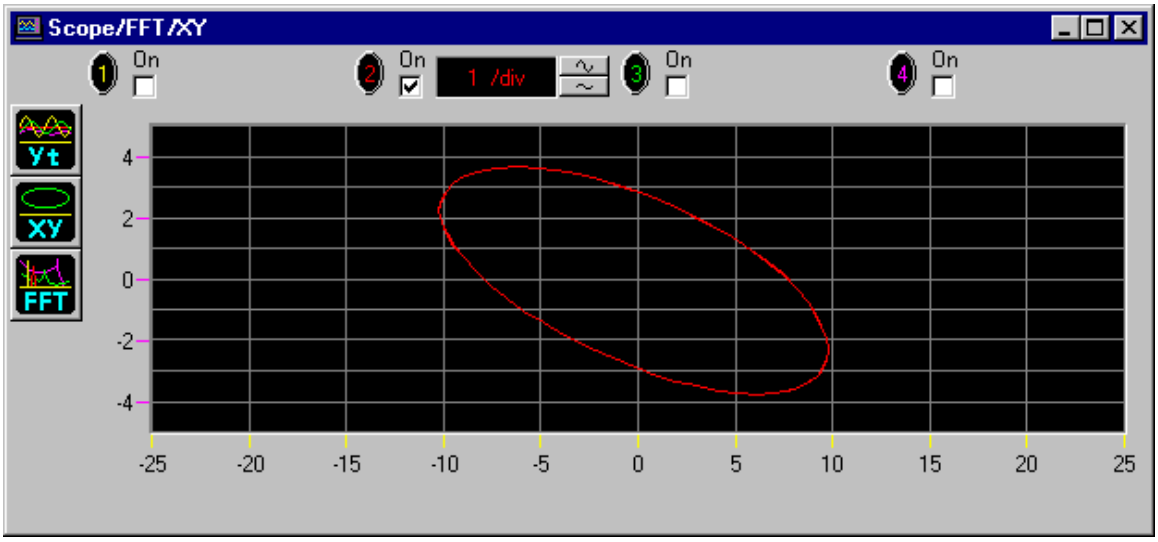
Oscilloscope Mode

YT Mode

The Oscilloscope window normally presents the input channels as a function of time. This is called **YT** mode. The Channel controls determine the amplitude and the Timebase control sets the time per division just as a standard oscilloscope.

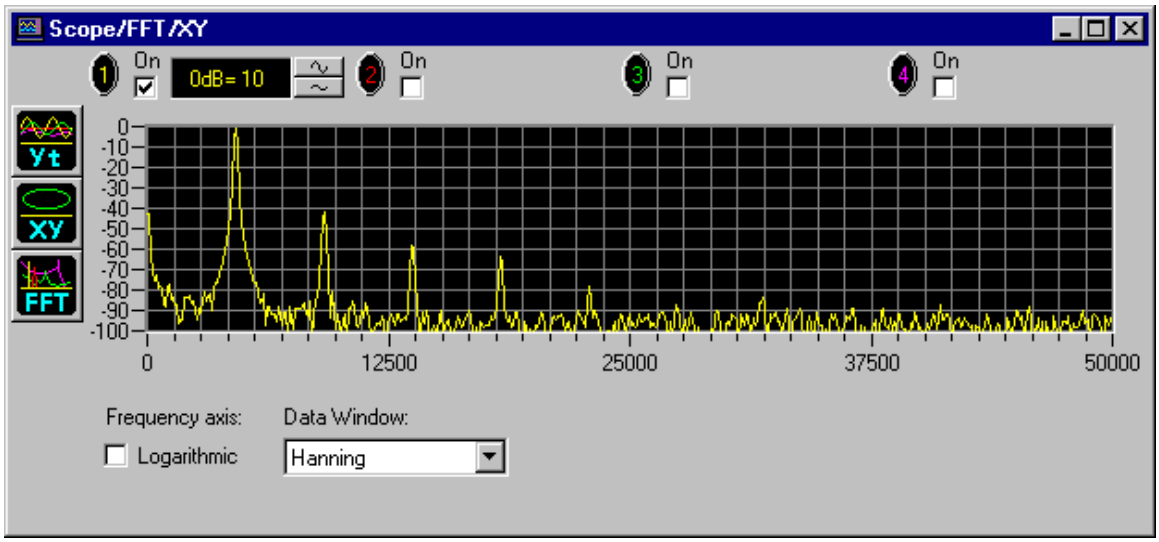
XY Mode

Click on the **XY** button at the left edge to view a real-time X/Y display. The first channel is always the X-axis (horizontal axis.) Y-axis (vertical) signals are provided by any or all of the other channels. Therefore up to three XY traces may be displayed. The example below shows Channel 2 versus Channel 1. The time window shown in the YT mode determines what portion of the signal is plotted in XY.



FFT Mode

Click on the **FFT** button to view a real-time spectral window. A 4K block of data is processed by an FFT algorithm several times a second, producing 2048 spectral lines. The amplitude is logarithmic with a selectable 0-dB reference. The controls under the spectral display select Linear or Logarithmic frequency axis and Data Window choices of Rectangular, Hanning or Flat-Top.



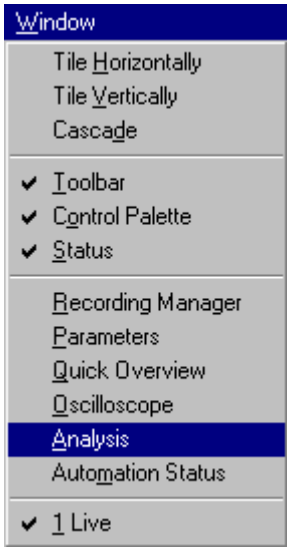
The highest frequency that can be analyzed is one-half the currently selected Acquisition Rate, commonly known as the Nyquist frequency. If Dual Rates are enabled, the Fast Rate is used for the FFT. Therefore with the 10 MS/s digitizer rate of the OD-200, signals up to 5 MHz may be analyzed. Due to the 4K FFT size, the lowest frequency is 1/2048 of the Nyquist frequency. To obtain the best FFT resolution, choose the lowest Acquisition Rate consistent with your signal's bandwidth. We recommend sampling at a minimum rate of 10 times the signal bandwidth to protect against aliasing. A rate dramatically higher than this guideline reduces your frequency domain resolution.

You may vary the FFT frequency span over a wide range by adjusting the Timebase control in the YT display. As is the case with the XY display, the FFT is performed on the data block that you see in the YT display. As you choose slower Time/div settings, the software decimates the full speed data stream to analyze lower frequencies. A table of Time/div settings and the corresponding Frequency range is shown below. At the highest speeds, the maximum frequency is limited by the maximum Acquisition Rate. At low speeds, FFT Resolution is limited by the Acquisition Rate divided by approximately 2000.

Time/div.	FFT Max Frequency	FFT Resolution (Approximate)	Time/div.	FFT Max Frequency	FFT Resolution (Approximate)
1 μs	5 MHz	2.5 kHz	5 ms	20 kHz	10 Hz
2 μs	5 MHz	2.5 kHz	10 ms	10 kHz	5 Hz
5 μs	5 MHz	2.5 kHz	20 ms	5 kHz	2 Hz
10 μs	5 MHz	2.5 kHz	50 ms	2 kHz	1 Hz
20 μs	5 MHz	2.5 kHz	100 ms	1 kHz	0.5 Hz
50 μs	2 MHz	1 kHz	200 ms	500 Hz	0.25 Hz
100 μs	1 MHz	500 Hz	500 ms	200 Hz	0.1 Hz
200 μs	500 kHz	250 Hz	1 s	100 Hz	0.05 Hz
500 μs	200 kHz	100 Hz	2 s	50 Hz	0.025 Hz
1 ms	100 kHz	50 Hz	5 s	20 Hz	0.01 Hz
2 ms	50 kHz	25 Hz	10 s	10 Hz	0.005 Hz

The highest Time/div settings are limited to 5 MHz due to the maximum digitizer rate of 10 MS/s. The lowest Time/div settings are limited by the current Acquisition Rate divided by approximately 2000: to analyze lower frequencies, simply select a slower Sample Rate.

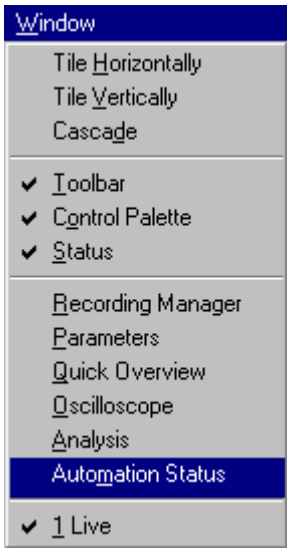
When you are finished viewing the Oscilloscope window, click the Close box in the upper right corner or click on the Toolbar Oscilloscope icon.



Analysis

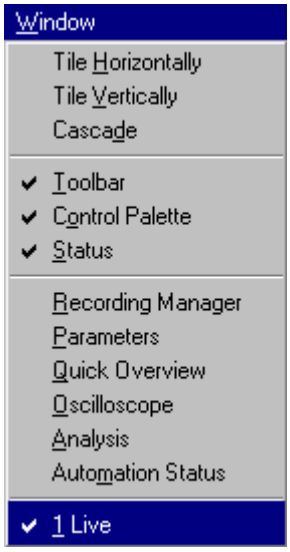
The ***Analysis*** command opens ProView or imPRESSion analysis software. If ProView/imPRESSion is already open, this command switches to their main window.

If this command is grayed, the ***Configure…Preferences*** dialog is not yet set to select which processing software you will use, or your system is not equipped with ProView.



Automation Status

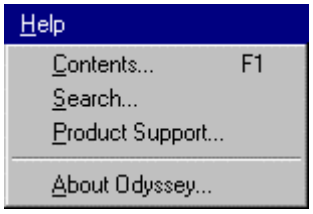
The ***Automation Status*** command displays the progress of automation actions in process, such as file saving, plotting, etc.



Open Recording List

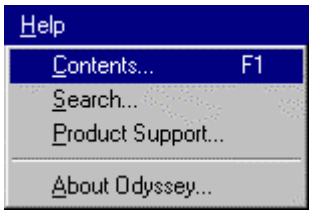
All the currently open recordings are listed at the bottom of the ***Window*** menu. Select a recording name to make that recording the active recording and bring it to the front.

Chapter 12:
Using the Help Menu



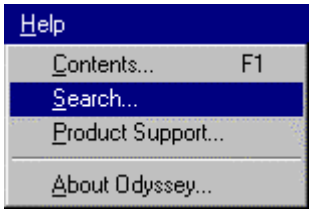
Help Menu

The ***Help*** menu contains commands that allow you to get help with your Odyssey and provide information about your system. Alternatively, pressing the Help key on the front panel or the F1 function key on the keyboard calls context-sensitive help for the current display or dialog.



Contents

The ***Contents*** command opens the Odyssey help system to the Contents tab, allowing you to select a help topic.



Search

The ***Search*** command opens the Odyssey help system to the search engine, allowing you to enter a word or words to search for in the help system.

Product Support

The ***Product Support*** command opens a dialog that provides information on how to reach Nicolet Technical Support.

About Odyssey

The ***About Odyssey*** command opens the Odyssey **About** dialog, which contains version and copyright information about your software.

Chapter 13:
Using the Toolbar

The **Toolbar** contains tools that allow you to quickly access commands without opening the menus.

Analyze Recording in Time Domain

The ***Analyze Recording*** tool opens a dialog that allows you to select options for sending the current recording to the optional imPRESSion or ProView for analysis.

This tool command has the same effect as selecting ***Analyze Recording*** then ***Time Domain Analysis*** from the ***File*** menu.

Refer to the *Analyze Recording* section in Chapter 6 for more information.

Analyze Recording in Spectral Domain

The ***Frequency Analysis*** tool opens a dialog that allows you to select options for exporting the current recording to SpectraPRO for analysis.

This tool command has the same effect as selecting ***Analyze Recording*** then ***Spectral Analysis*** from the ***File*** menu.

Refer to the *Analyze Recording* section in Chapter 6 for more information.

Post Processing

The ***Post Processing*** tool opens a dialog that allows you to select options for exporting the current recording to other spreadsheet and database applications for analysis.

This tool command has the same effect as selecting ***Analyze Recording*** then ***Post Processing*** from the ***File*** menu.

Refer to the *Analyze Recording* section in Chapter 6 for more information.

Goto

The ***Goto*** tool opens a dialog that allows you to move the current cursor and/or the display to a specific area of the recording, based on a counter value, marker, trigger, bookmark or level search.

This tool command has the same effect as selecting ***Goto*** from the ***Edit*** menu or selecting ***Goto*** from the ***Cursors*** submenu in the ***Display*** menu.

Refer to the *Go To* section in Chapter 7 for more information.

Configure Display

The ***Display*** tool opens a dialog that allows you to select the number of panes and the channels to display in each pane in the **Recorder Display**. You can configure each page separately.

This tool command has the same effect as selecting ***Display*** from the ***Config*** menu.

Refer to the *Display* section in Chapter 8 for more information.

Change Active Trace

The Change Active Trace area displays a drop down menu when you click on the arrow. The list of traces (channels) configured for the current page appears. Selecting one of the channel names from the list makes that trace the active trace. The active trace is indicated in the **Recorder Display** with a box around it, as shown below.

Traces can also be selected by pressing the **Select** button on the front panel or by clicking the mouse on the **Recorder Display**.

Compress Time Scale

The ***Time Scale -> Compress*** tool compresses the time scale in the **Recorder Display** to the next greater time/div, so that more data is shown on screen. Pressing it multiple times shows more and more of the total record length, up to the full length of the recording.

Note: *This button is active only when the recorder is stopped.*

Expand Time Scale

The ***Time Scale -> Expand*** tool expands the time scale in the **Recorder Display** to the next smaller time/div, which creates a zoom effect.

Note: *This button is active only when the recorder is stopped.*

Activate Page

The ***Activate Page*** tool changes the active page to the one you select in the pulldown menu. The **Recorder Display** then changes to that page.

 Use the ***Configure Display*** tool command to configure the display for each page.

Refer to the *Display* section in Chapter 8 for more information.

Cursor Values

The ***Cursor Values*** tool opens the **Cursor Values** dialog, showing information about the cursors.

This tool command has the same effect as selecting ***Values*** from the ***Cursors*** submenu in the ***Display*** menu.

Refer to the *Cursor Values* section in Chapter 10 for more information.

Calculate

The ***Calculate*** tool opens the **Calculation** dialog which measures over 20 common waveform parameters.

This tool command has the same effect as selecting ***Calculate*** from the ***Display*** menu.

Refer to the *Calculate* section in Chapter 10 for more information.

Recording Manager

The ***Recording Manager*** tool opens a dialog that allows you to organize, copy and export your recordings.

This tool command has the same effect as selecting ***Recording Manager*** from the ***Window*** menu.

Refer to the *Recording Manager* section in Chapter 11 for more information.

Parameter

The ***Parameter*** tool toggles display of the **Parameter** window in the **Recorder Display**.

This tool command has the same effect as selecting ***Parameters*** from the ***Window*** menu.

Refer to the *Parameters* section in Chapter 8 for more information.

Quick Overview

The ***Quick Overview*** tool opens a window containing VU-meter style displays for all analog input and LED-style indicators for digital inputs.

This tool command has the same effect as selecting ***Quick Overview*** from the ***Window*** menu.

Refer to the *Quick Overview* section in Chapter 11 for more information.

Oscilloscope WIndow

The ***Oscilloscope window*** tool displays or hides the oscilloscope-like high speed display. It is available only if your system contains the high speed OD-200 acquisition card.

This tool command has the same effect as selecting ***Oscilloscope*** from the ***Window*** menu.

Refer to the *Oscilloscope Window* section in Chapter 11 for more information.

Automation

The ***Automation*** tool displays or hides the status of any automated actions in process.

This tool command has the same effect as selecting ***Automation Status*** from the ***Window*** menu.

Refer to the *Automation* section in Chapter 8 for more information.

Shut Down

The ***Shut Down*** tool command opens a dialog that allows you to shut down your Odyssey or exit to Windows.

This tool command has the same effect as selecting ***Shut Down*** from the ***File*** menu.

Refer to the *Shut Down* section in Chapter 6 for more information.

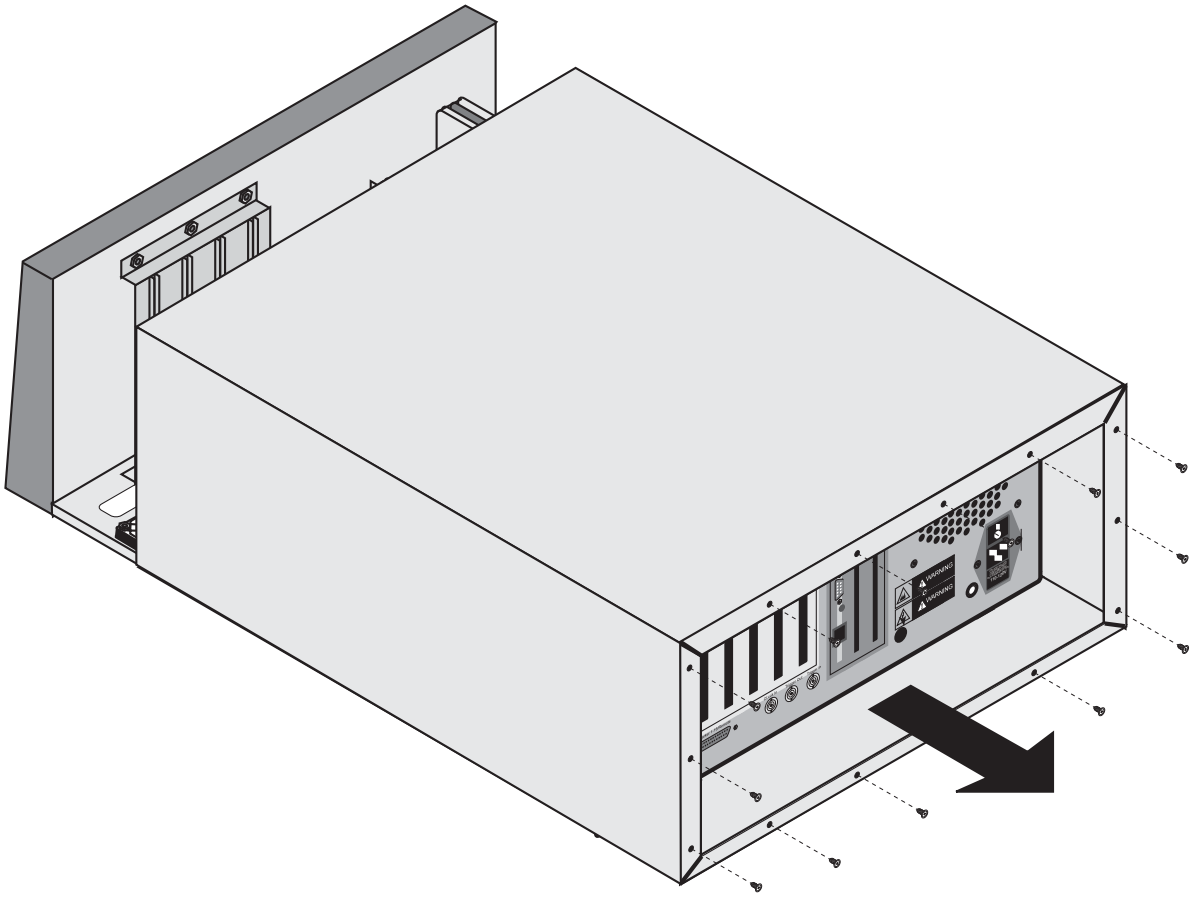
Appendix A: Installing Additional Modules and Software

Removing the Covers

To remove the cover of an Odyssey 32 channel mainframe, remove the fourteen screws from the back and pull the cover back and off as shown below.

Take care that the gasket fingers inside the front of the cover do not catch on internal components as you slide the cover back. The gaskets and large number of screws are required to meet the demanding CE emission standards.

To re-install the cover, slide it forward over the chassis. Assure that the flange on the inside of the cover interlocks with the grooves in the front panel. Tighten the securing screws only after verifying the front is properly interlocked around its circumference.



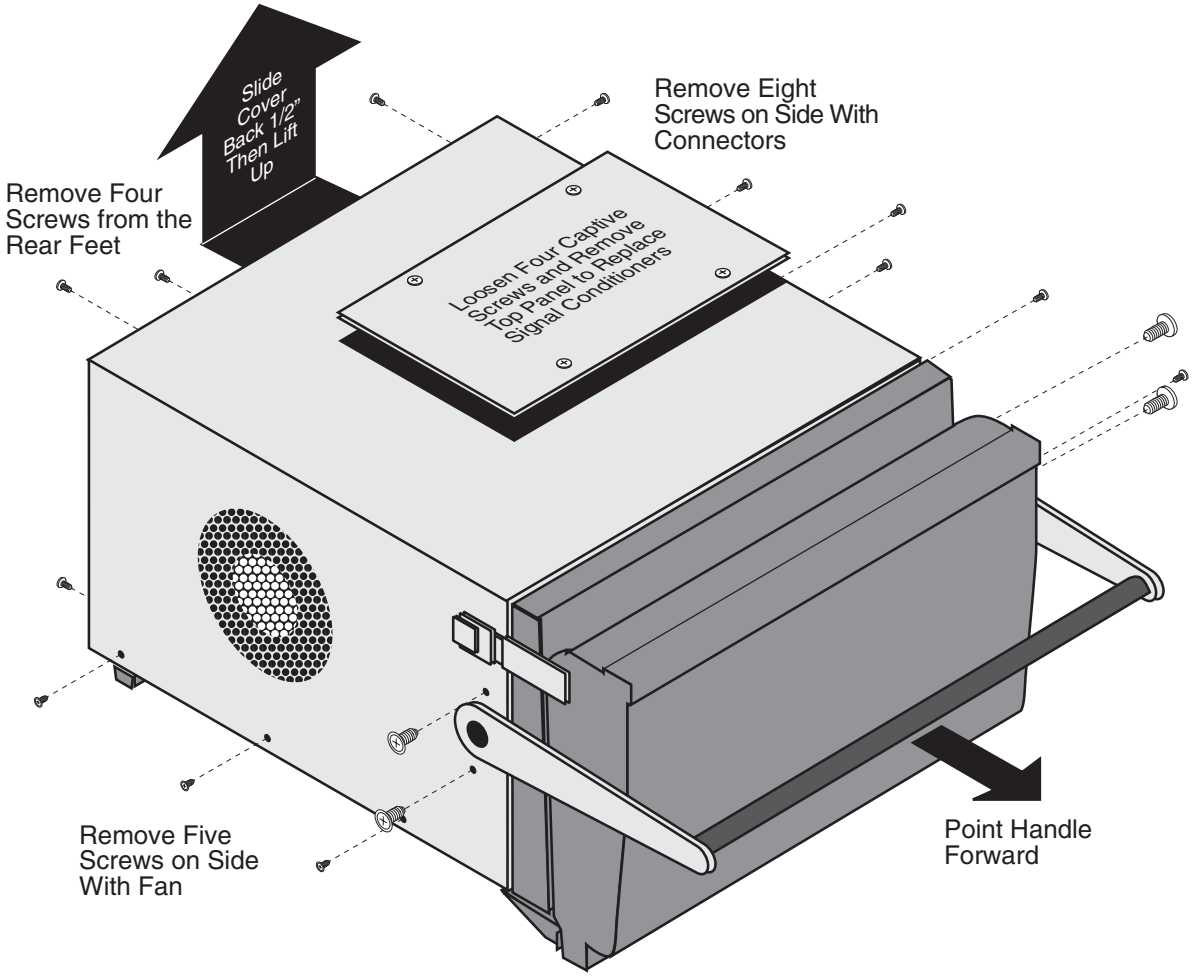
It is not necessary to remove the entire cover on the Ruggedized Odyssey "R" when removing or replacing signal conditioners. To remove the signal conditioner access panel, loosen the four captive screws and remove the panel.

To remove the cover of a Ruggedized Odyssey "R":

1. Put the keyboard in the up position, but do not fasten the two latches.
2. Point the handle forward.
3. Remove the screws (shown below). Remove the signal conditioner access panel.
4. Slide the cover back about 1 cm and lift up to remove.

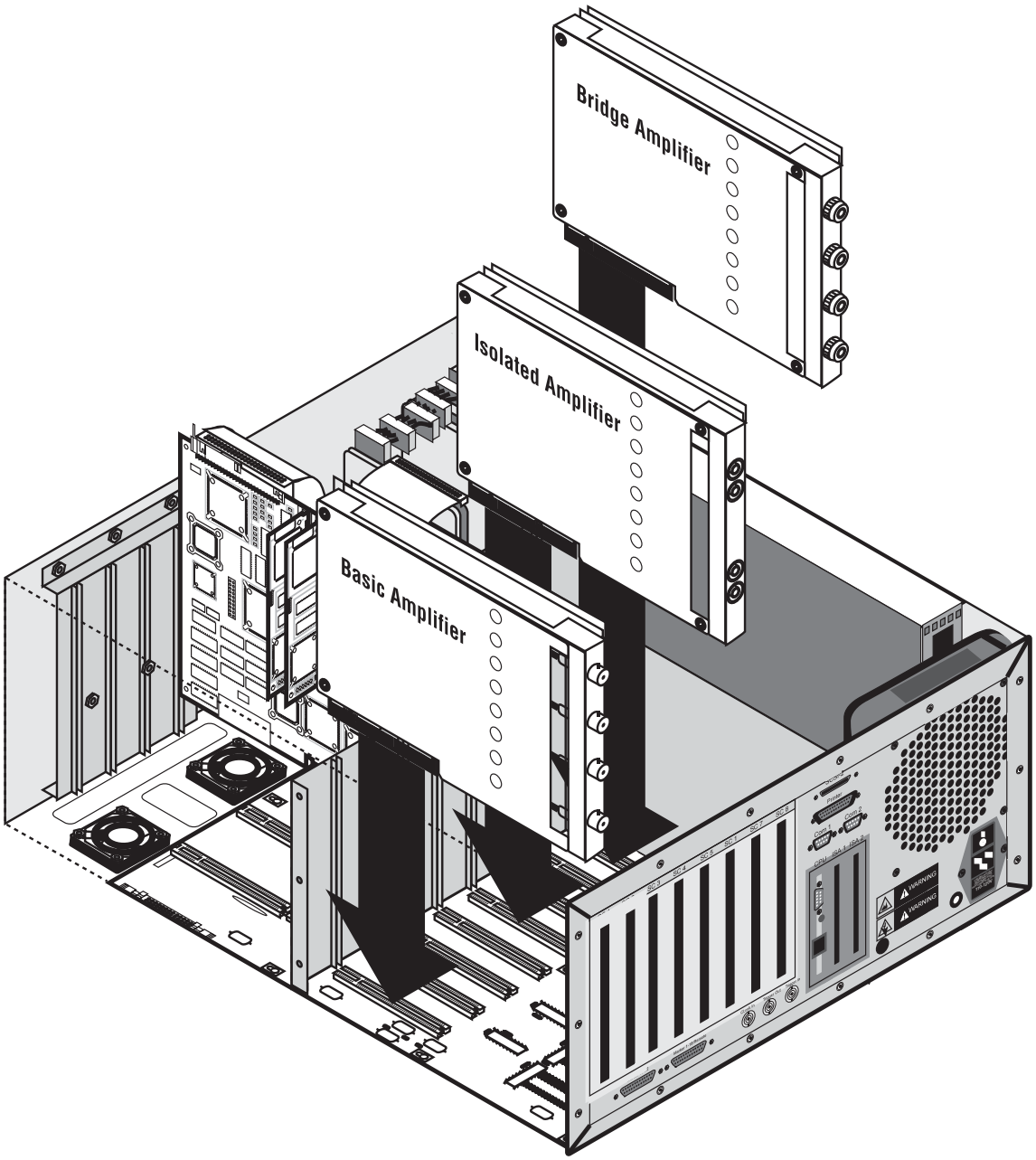
To reinstall the cover of a Ruggedized Odyssey "R":

2. Slide the cover back on vertically, and then bring it forward to mate with the front panel grooves.
3. Replace the back screws first. Tighten them while checking front panel gasket alignment.
5. Replace the screws near the handle last.



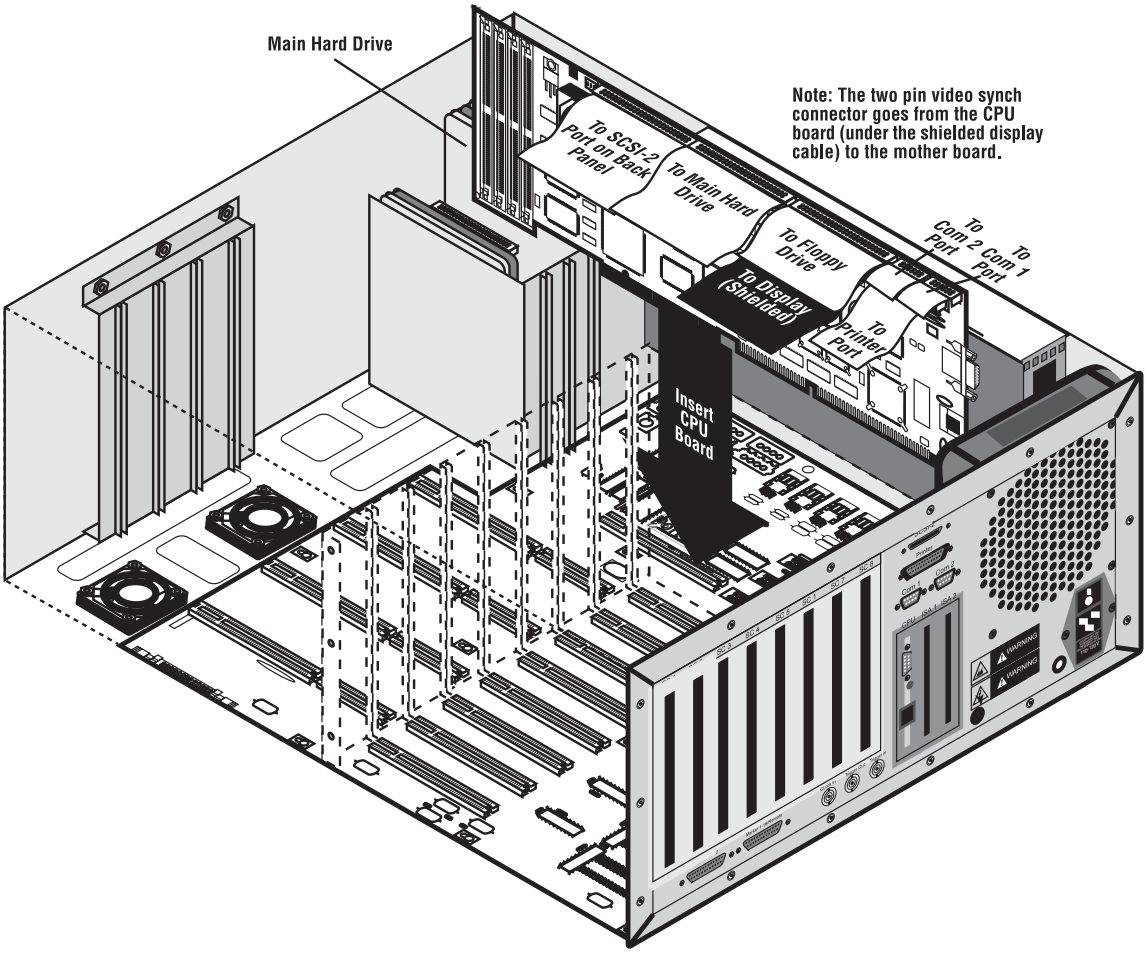
Installing Signal Conditioner Modules

Signal Conditioner modules can be installed in any of the available slots. To install a module, seat the module in the slot and push firmly until the module seats in the slot. Secure the fastening screw at the rear panel. The Odyssey automatically detects the new modules when power is applied. Select ***File…New System Setup*** on the main Odyssey menu to initialize, then select ***Configure…Signal Conditioners*** to set up the new amplifiers.



Installing the CPU Board

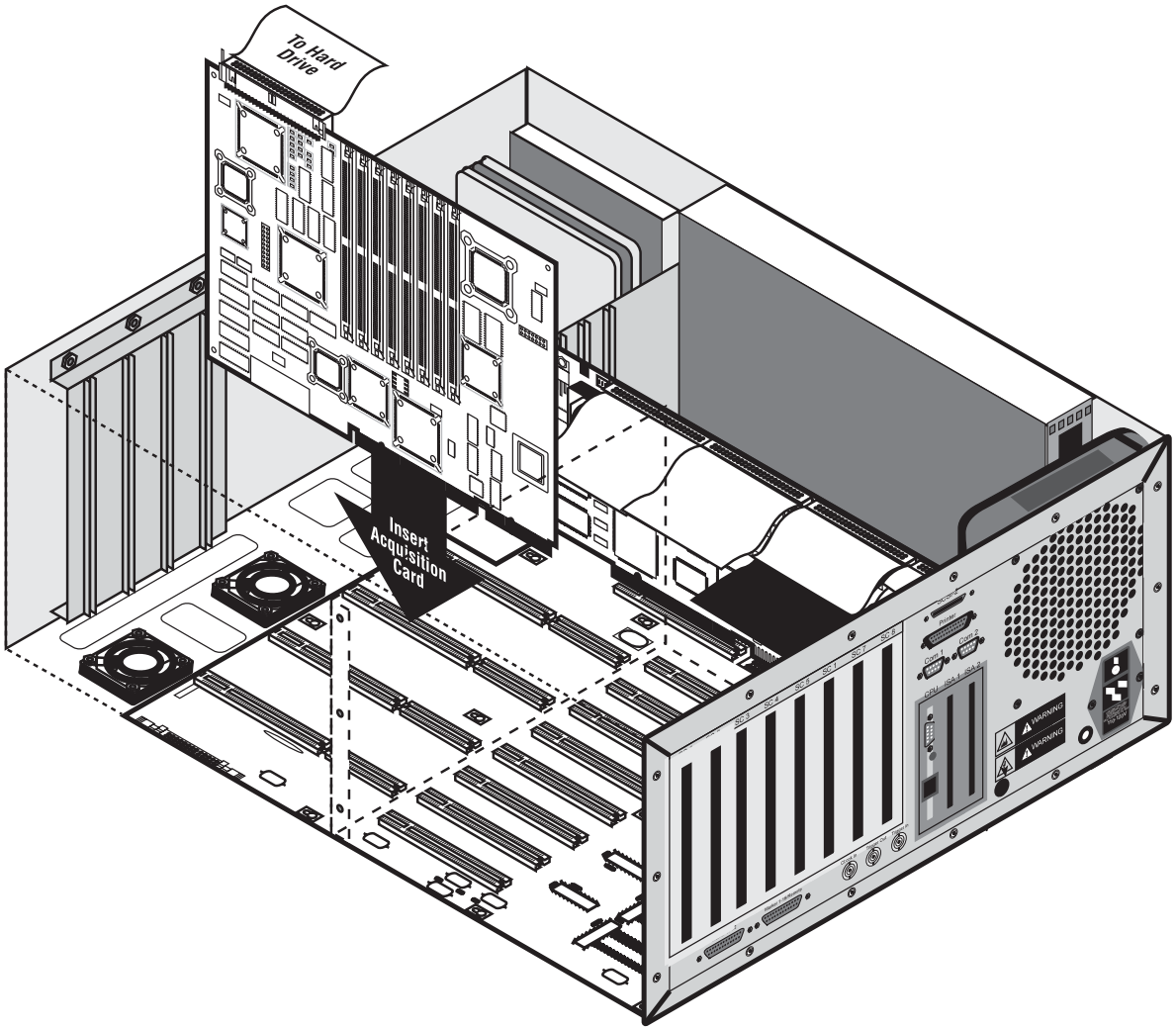
The CPU board is installed as shown below. Seat the board in the correct slot and push firmly until the card seats in the slot. Be sure you connect all the cables, including the two pin video synch connector as noted below.



Installing the Acquisition Card

The acquisition card is installed as shown below. Seat the card in the next open slot, beginning from the inside, and push firmly until the card seats in the slot. This card connects to the hard drive. To install the hard drive, see the next section, *Installing the Hard Drive*.

After a new acquisition card or hard disk is installed, it is necessary to re-initialize the drives. Proceed to *Re-Initializing the Acquisition Disks*, page A-12.

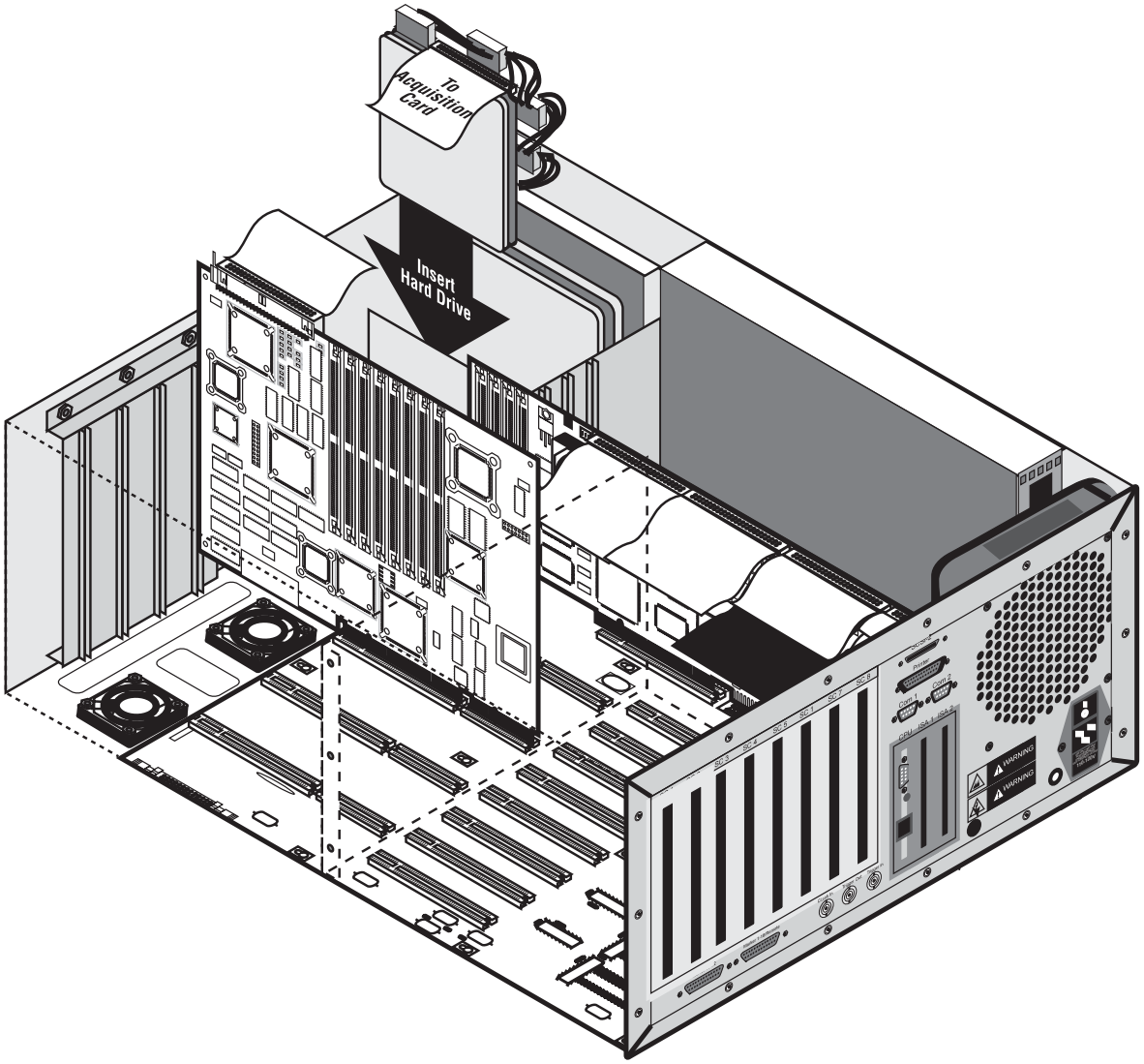


Installing the Hard Drive

The hard drive is installed as shown below. To secure the disk drive, it is necessary to remove the drive cage by removing the four securing screws from the bottom of the system. Attach the drive to the cage (four shouldered screws) and reinstall the cage (four screws).

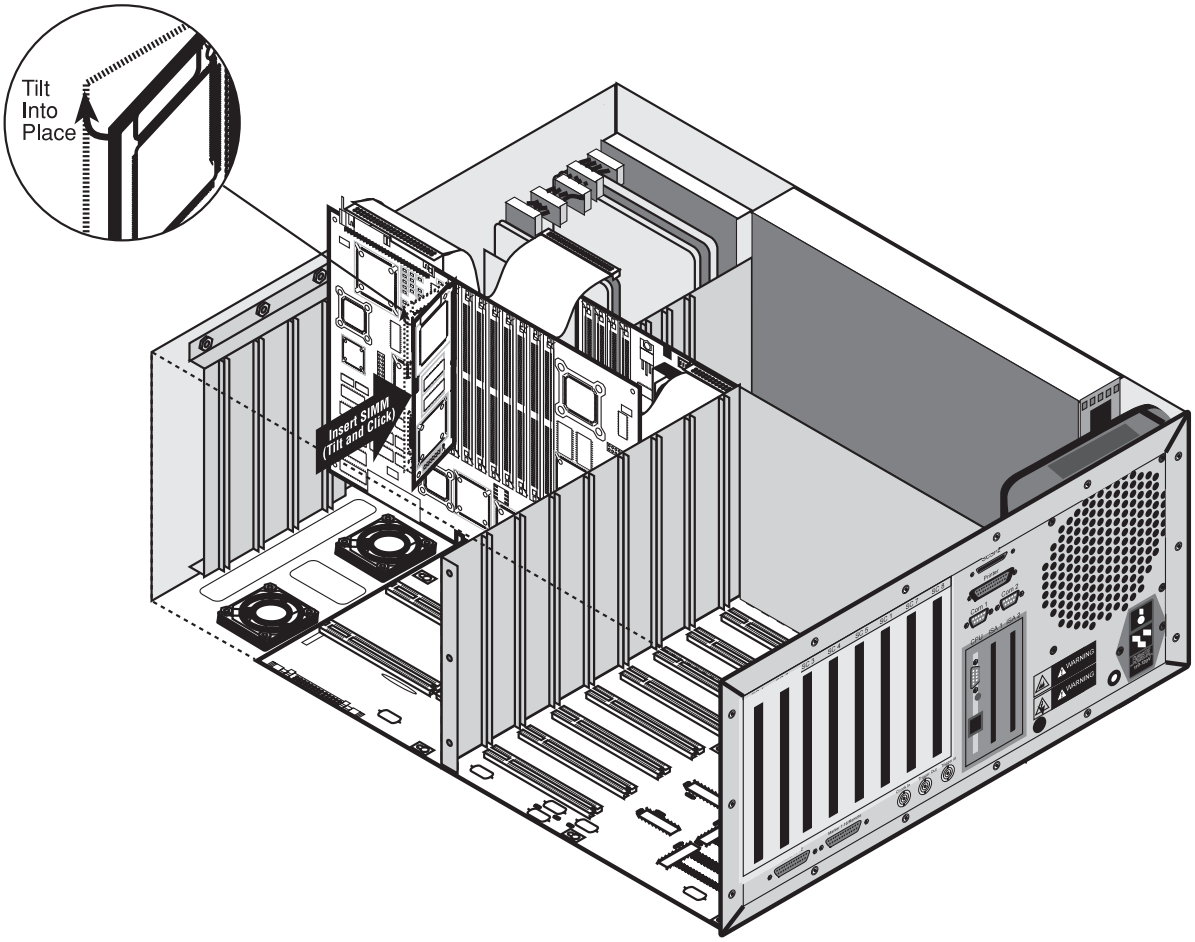
Connect the 4-wire power cable to the hard drive. Connect the ribbon cable from the drive to its corresponding acquisition card. The innermost drive connects to the innermost acquisition card.

After a new acquisition card or hard disk is installed, it is necessary to re-initialize the drives. Proceed to *Re-Initializing the Acquisition Disks*, page A-12.



Installing OD-100 SIMMs

The Odyssey OD-100 acquisition card uses 8 SIMMs, each with a Digital Signal Processor for one channel. To remove a SIMM, release the small spring clips at each end of the socket and tilt the SIMM toward the rear of the instrument. To install a SIMM, insert the SIMM into the slot at an angle and tilt into place as shown below.



Installing Windows Software

To add features to Windows that are not installed by default, go to the Start menu and select **Settings…Control Panel**, then **Add/Remove Programs.** The **Windows Setup** tab allows you to add optional Windows features.

At this time Nicolet supports Windows 95 and Windows 98 Second Edition on the Odyssey. No other operating system may be installed. A backup copy of your operating system and all Odyssey software is contained in the directory C:\INSTALL.

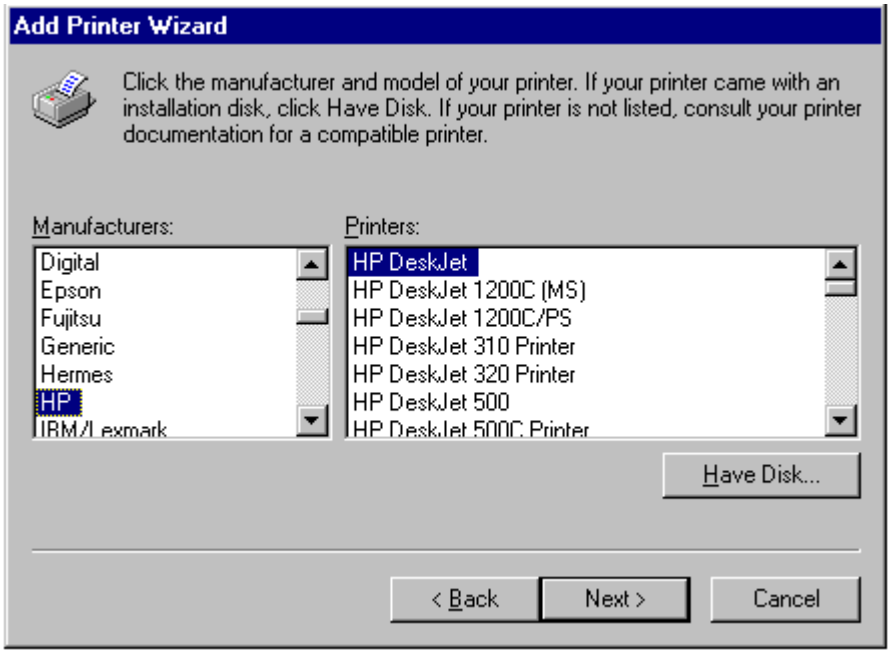
Installing New Printers

Windows supports over 1000 printers, and you may use any of them with your Odyssey system.

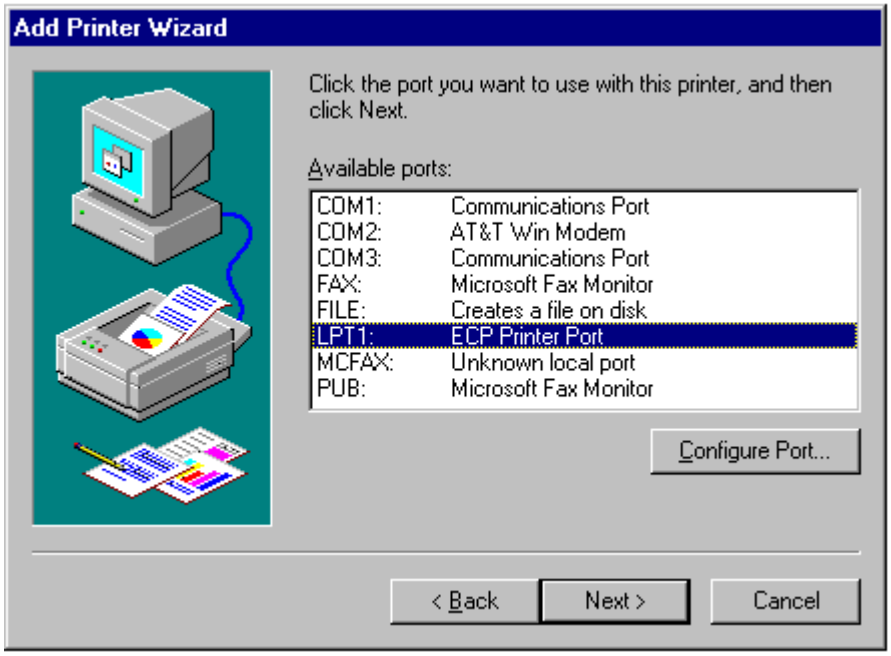
To install a new printer:

1. From the **Windows Start** menu, select **Settings** and then **Printers**.
2. In the Printers window, double-click the icon Add New Printer. The following dialog will appear.

3. Click **Next>**, select Local Printer or Network Printer, and click **Next>** again.
4. Select your model from the Windows list of supported printers, or click "Have Disk.." if your printer was supplied with a driver disk.



5. For a local printer, select the port to be used (normally LPT1:.) For a network printer, enter the network identification for the printer you wish to use. Your Network System Administrator may need to provide this information. Finally, select whether Windows should use this printer as the default printer. When finished, click **Next>**.



6. When asked to print a test page, click **Yes** and then click **Finish**.

7. Windows will install the printer drivers and print a test page.

Installing a Windows Network

Your Odyssey is preinstalled with Windows drivers for Microsoft Networking. The installed protocol is TCP/IP. The Ethernet adapter is resident on the CPU board and requires no additional settings. To mount your Odyssey system on the network, first consult your network administrator for the required protocol settings, network identification and password. In most cases, simply entering your network information is sufficient and no additional driver installation is needed.

1. From the **Windows Start** menu, select **Settings…** and then **Control Panel**.
2. Double-click the icon **Network**.
3. Select the appropriate Client software and click its **Properties** button. Enter your Windows NT domain name and click **OK**.
4. Select the TCP/IP protocol and click the **Properties** button. Enter the configuration data supplied by your administrator.
5. Select the **Primary Network Logon** as Microsoft Networks.
6. Select the **Identification** tab and enter your **Computer Name** and **Workgroup**.
7. Click **OK** and allow the system to reboot. Enter your password when asked.
8. To test the network installation, double-click the Desktop icon Network Neighborhood and confirm that your server(s) are now available.

If for some reason it is necessary to install a different network driver, it is VERY IMPORTANT you completely back up your hard disk with an appropriate 32-bit Windows utility before proceeding. Poorly-behaved network software, particularly 16-bit Windows 3.x software, can PERMANENTLY DAMAGE the Windows operating system. Any such damage is not covered by Nicolet warranty.

This completes basic network installation for the Odyssey system. If you will be using any of the Nicolet remote control or communication programs, there are several configuration steps that will be necessary on your remote PC. Nicolet DataViewer and Odyssey Master Control software use the Microsoft Distributed Component Object Model (DCOM) to communicate with the Odyssey. DCOM is pre-installed on your Odyssey, but may not be included on your PC. DCOM installation, configuration and testing for your PC is described in the documentation for these software packages.

Installing Odyssey Software

A backup copy of the Odyssey software is located on your system hard disk in the directory C:\INSTALL\ODYSSEY. Each upgrade supplied by Nicolet also copies itself into the same location. If for some reason you suspect the software has been damaged, you may reinstall it by running the program SETUP.EXE in this directory.

Installing ProView Software

If your system contains the optional ProView analysis software, a backup copy is located on your hard disk in the directory C:\INSTALL\PROVIEW. Each upgrade supplied by Nicolet also copies itself into the same location. If for some reason you suspect the software has been damaged, you may reinstall it by running the program SETUP.EXE in this directory.

Re-Initializing the Acquisition Disks

If you install new acquisition cards or upgrade to larger acquisition disks, you must reinitialize the disk(s) directories. This process PERMANENTLY DESTROYS all existing data on the acquisition disk(s), so be sure you have copied all important recordings to a Library Shelf before performing this procedure.

1. Using the Windows Explorer, locate the file CHARACTERIZE.EXE. It may be in the C:\ODYSSEY directory or the C:\INSTALL subdirectory.
2. Double-click the CHARACTERIZE.EXE icon to run the program.
3. After Characterize recognizes the acquisition card(s), press the **Init Disk** button. Click **OK** when asked to confirm the initialization. The program will close after completing the initialization. It requires about 10 minutes for 1GB drives, about 80 minutes for 9GB drives.
4. Close all open windows, **Shut Down** and restart the system.

Installing and Using IRIG/GPS Options

Nicolet offers two optional internal plug-in cards to provide precision time-of-day and digitizer timing for the Odyssey. The Datum Bancomm model bc620AT card accepts IRIG time code inputs. The model bc627AT accepts both GPS and IRIG time codes, and includes a GPS receiver with 15 meters (50 feet) of cable. Longer cables are available on special order. The GPS receiver must be physically mounted outside any building with a clear view of the sky.

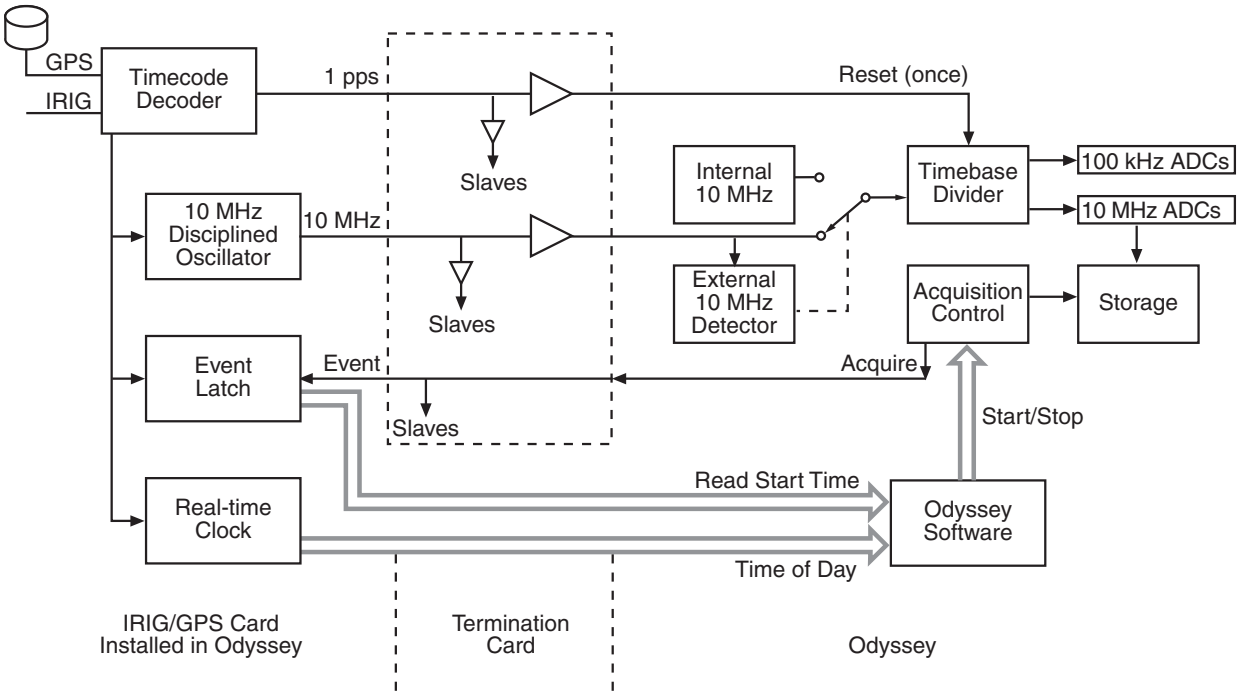
The IRIG/GPS cards develop a highly accurate time by receiving coded timing signals, either from a pre-existing IRIG signal source or from a GPS satellite receiver. The Odyssey mainframe uses several features of the card to provide absolute time synchronization to the IRIG/GPS input.

a. The IRIG/GPS card includes a very stable oscillator of 10 MHz that is disciplined to precisely track the timecode input. If the timecode signal is lost or not available at a particular location, the oscillator "flywheels" at a rate that is much more accurate than a conventional crystal oscillator or the normal PC time-of-day clock. The Odyssey's digitizers are driven directly from the 10 MHz clock so that every sample is inherently synchronized to the timecode source. Unlike traditional instrumentation recorders, there is no need to use a separate channel to record the timecode and no need for a playback decoder and display. As an additional fail-safe precaution, the Odyssey automatically reverts to its internal clock source if the IRIG/GPS clock is lost for any reason.

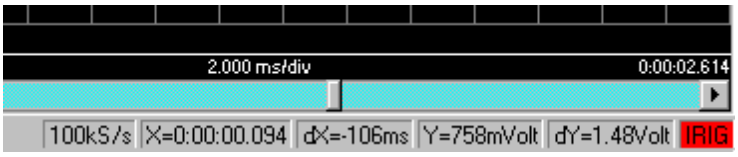
b. The card provides a high-speed hardware event latch that is driven by the Odyssey's "Acquire" signal. The Odyssey uses this to accurately capture the precise start time of each Recording. Since the start time is known exactly and the digitizer clock is derived from the timecode itself, there is no drift or inaccuracy regardless of the length of the Recording. The absolute time of every sample is known with the full accuracy of the timecode source.

c. The card provides a one pulse per second output that is used to initialize the Odyssey's timebase dividers, and assure that multiple mainframes are synchronized to the same edge of the 10 MHz clock.

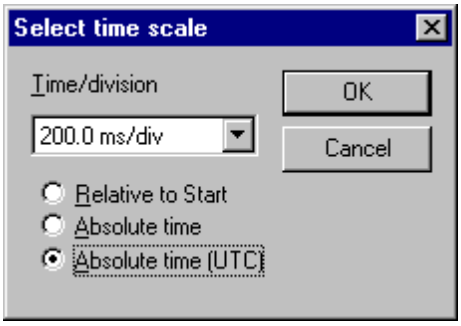
Nicolet provides the IRIG/GPS card with a special cable and small termination card that buffers the signals and connects them from the IRIG/GPS rear panel to the Odyssey hardware. The termination card also contains buffers to drive seven additional Odyssey mainframes. Up to eight Odyssey mainframes can be absolutely synchronized with each other using the timecode input from a single IRIG/GPS card. The ninth, seventeenth, etc. mainframes must be equipped with another IRIG/GPS card.



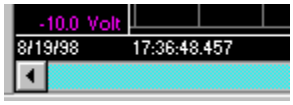
As soon as the IRIG/GPS card is installed and connected, the Odyssey uses its precision 10MHz clock and time-of-day for all operations. An IRIG indicator in the lower right corner of the display becomes green when a timecode input is being tracked, or red when the system is flywheeling without a timecode signal. The flywheeling status is not an error condition, only an information item: the system remains fully operational without a timecode signal but absolute timing accuracy will slowly degrade. (The typical drift rate of the precision oscillator is 5e-7, or 2ms per hour.)



The time display format is not automatically changed: it remains a user-selectable option to accommodate differing user preferences. If you prefer to view the time information in IRIG time-of-day format, you may select Universal Time in the Odyssey's Display menu. Select ***Display…Time Scale…Select*** to show the dialog below.



Select ***Absolute time (UTC)*** rather than the default ***Relative to Start*** in order to show Universal Time on screen. Today's date and the Universal Time in 24-hour format are displayed. The Date format is that selected in Windows Control Panel under Regional Settings.



Making a Synchronized Recording

To manually make a synchronized Master/Slave Recording on one or a number of Odyssey mainframes:

a. Make the desired acquisition settings on all channels of each mainframe. It is strongly recommended you give unique names to each channel for ease of identification after the Recording is made. Confusion will result if each mainframe has a "Ch1."

b. With power off on all systems, connect the Master and Slave cables.

c. Select **Master/Slave** mode on all the mainframes' ***Control*** menu. This allows all mainframes to be controlled by the global Acquire signal. It also enables the IRIG card's precision timestamp capture.

d. To assure that all mainframes remain synchronized, the Master/Slave setting prevents the Pause mode from being used. To use Pause for monitoring while setting up your systems, temporarily turn off Master/Slave.

e. Press the **Start** button on the front panel of each mainframe. All systems will wait until a global Acquire signal is released by the last mainframe. The mainframes will begin recording synchronously when the last Start button is pressed. The precise Start time is captured by the IRIG card's event latch. The digitizer clock is directly derived from the IRIG signal.

f. To end the Recording, press **Stop** on the front panel of any mainframe. All mainframes will terminate recording.

All samples are precisely time-aligned within a few nanoseconds by the Master's clock signal. The Recordings on all systems will be precisely the same length. However, only the Master's Recording contains the precise Start time from the IRIG/GPS time code.

To conveniently set up, control, monitor, and display data from a number of Odyssey mainframes on your PC, Nicolet offers an optional Master Control software. Please contact your Nicolet representative for full information.

IRIG/GPS Specifications:

IRIG Absolute Time Accuracy:	Accuracy of IRIG source, plus 10 us
GPS Absolute Time Accuracy:	± 2 us
GPS Receiver Frequency:	1.575 GHz C/A code, 6 channels
GPS Initial Acquisition Time:	3 to 20 minutes after power-up
GPS Receiver Maximum Velocity:	300 meters/s
Timebase Accuracy when tracking IRIG or GPS input:	Typical 5e-8
Flywheeling Stability when no timecode input:	Typical 5e-7 (2 ms/hour)
IRIG input formats (pin 7, ground at pin 8):	IRIG A, B, 2137; NASA 36
IRIG output format (pin 5, ground at pin 8):	IRIG-B format, 3Vp-p, 3:1 modulation
Maximum Cable length between Mainframes:	3 meters
Time Alignment across Master and Slave Mainframes:	Within approximately 10 ns, plus 10 ns per meter of cable
Status Reporting in Odyssey application:	Grayed: no IRIG/GPS card present Red: Flywheeling, no input found Green: Locked and tracking
Synchronization of PC clock:	Manually: click button in Device Manager, IRIG Properties to set PC to IRIG/GPS time

Installation Instructions

If you have received your IRIG/GPS option with your Odyssey, then a complete installation has already been done and you may proceed to the last Section, Cabling.

If you received your IRIG/GPS option as an add-on for an Odyssey you already have, then you will have to install both hardware and drivers yourself. Proceed with the installation procedures shown below.

System Requirements

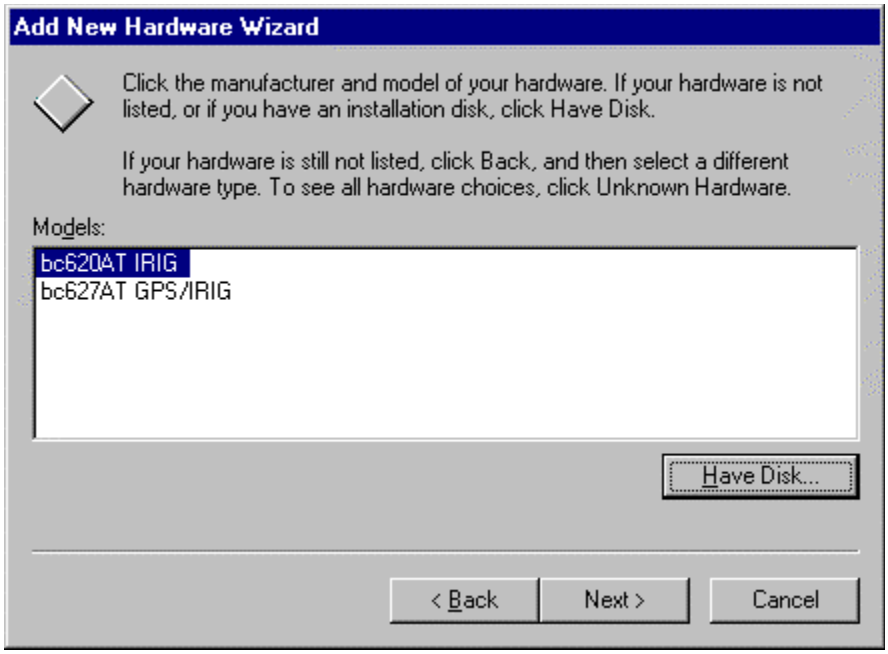
- Odyssey mainframe with backplane of version –05 or greater. If **Master/Slave** is available in the Odyssey **Control** menu, your system meets this requirement.
- PCI-936 CPU card or later. Look for this identification on the first boot screen.

Software Installation

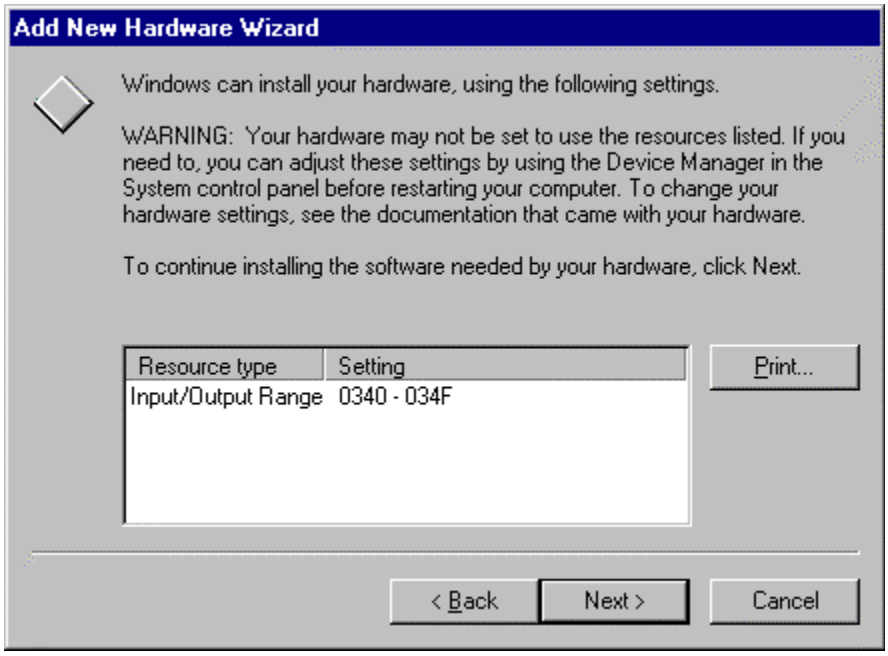
1. From the Windows Control Panel, double-click "**Add New Hardware**".
2. Click the **[Next]** button.
3. Select the **No** radio button when Windows asks to search for your new hardware, and then click the **[Next]** button.

4. From the "Hardware types" list, select **Other devices** and then click the **[Next]** button.
5. From the manufacturers list choose Datum Inc. If Datum is not listed, click the **[Have Disk]** button and insert the Nicolet Odyssey IRIG/GPS Driver diskette into the floppy drive.

6. Select the model of IRIG/GPS card you are installing (bc620AT IRIG only or bc627AT GPS/IRIG) and click the **[Next]** button.



7. The next window should display an I/O address range of 0340-034F. Accept this range by clicking the **[Next]** button.

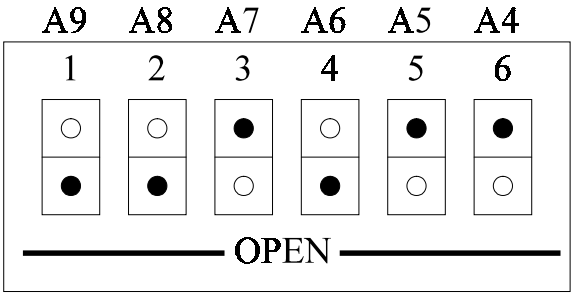


8. Click the **[Finish]** button to finish the installation.

9. Select ***Yes*** for "Do you want to shut down your machine".

Hardware Installation

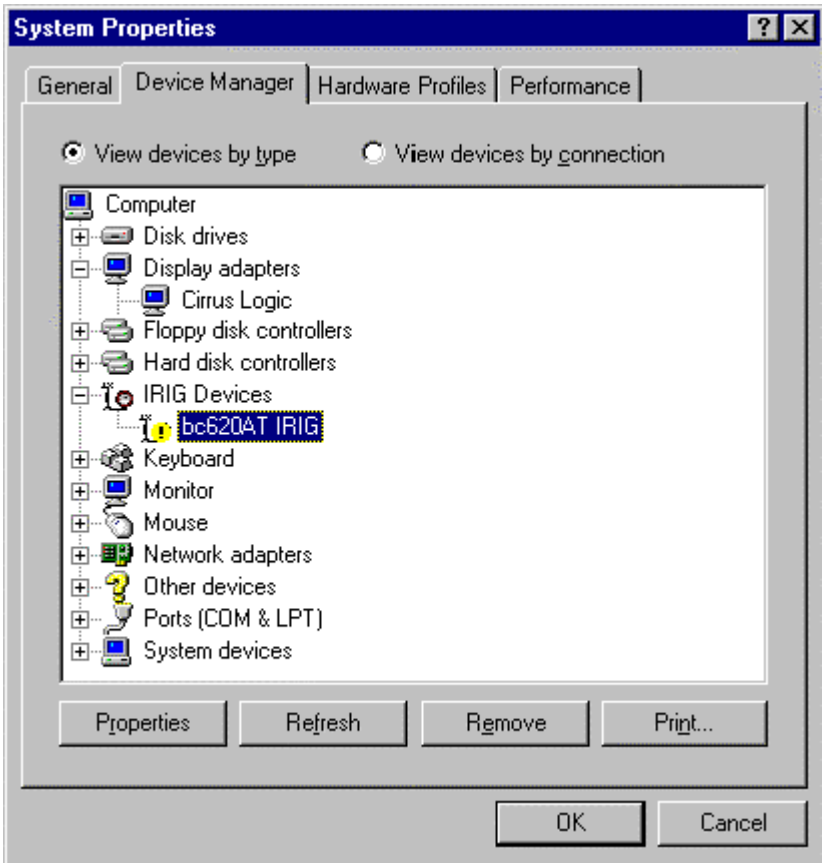
1. Verify that the IRQ jumper on the IRIG card is placed on the "No IRQ" setting (pins 23 and 24 of JP1).
2. Set the DIP switch, SW1, to address 0340 as shown in figure 5 below.
   ● = this side depressed.



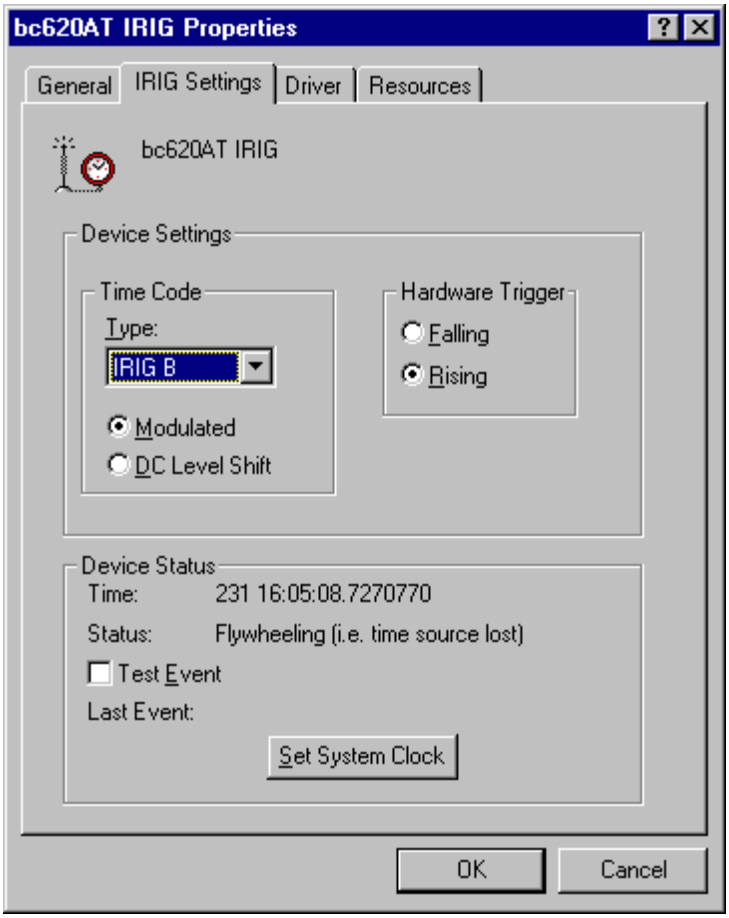
3. Power Down your Odyssey and remove the outer cover. Remove the blank cover from one of the ISA slots. Save the screw.
4. Install the IRIG card and secure with the screw saved from step 3.
5. Power Up your Odyssey.

Verification

1. From the Control Panel, double-click "System".
2. Select the **Device Manager** tab.
3. Double-click the IRIG Devices\bc620AT IRIG (or bc627AT IRIG/GPS.)



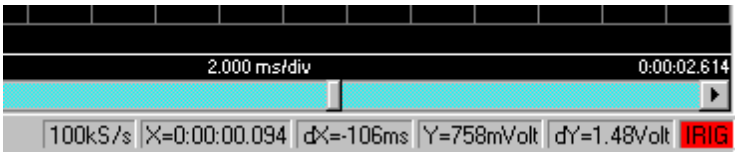
4. Select the **IRIG Settings** tab.



5. Verify that the time is shown in the Device Status block. (If an input signal is not yet being tracked, the time will not be correct.) If desired, click the Set System Clock button to align the PC's clock to the IRIG time.

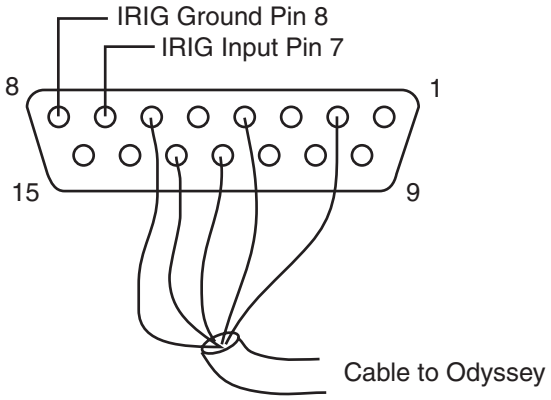
6. If using IRIG timecode input, select the desired IRIG input format from the pull-down list.

7. In the Odyssey application, observe the IRIG indication in the lower right corner of the Status bar. This constantly displays the same information that the Device Manager status shows as "Tracking" or "Flywheeling" status. If you have achieved IRIG or GPS timecode synchronization, this indicator will be green. If the card is flywheeling without an input signal, the indicator will be red.



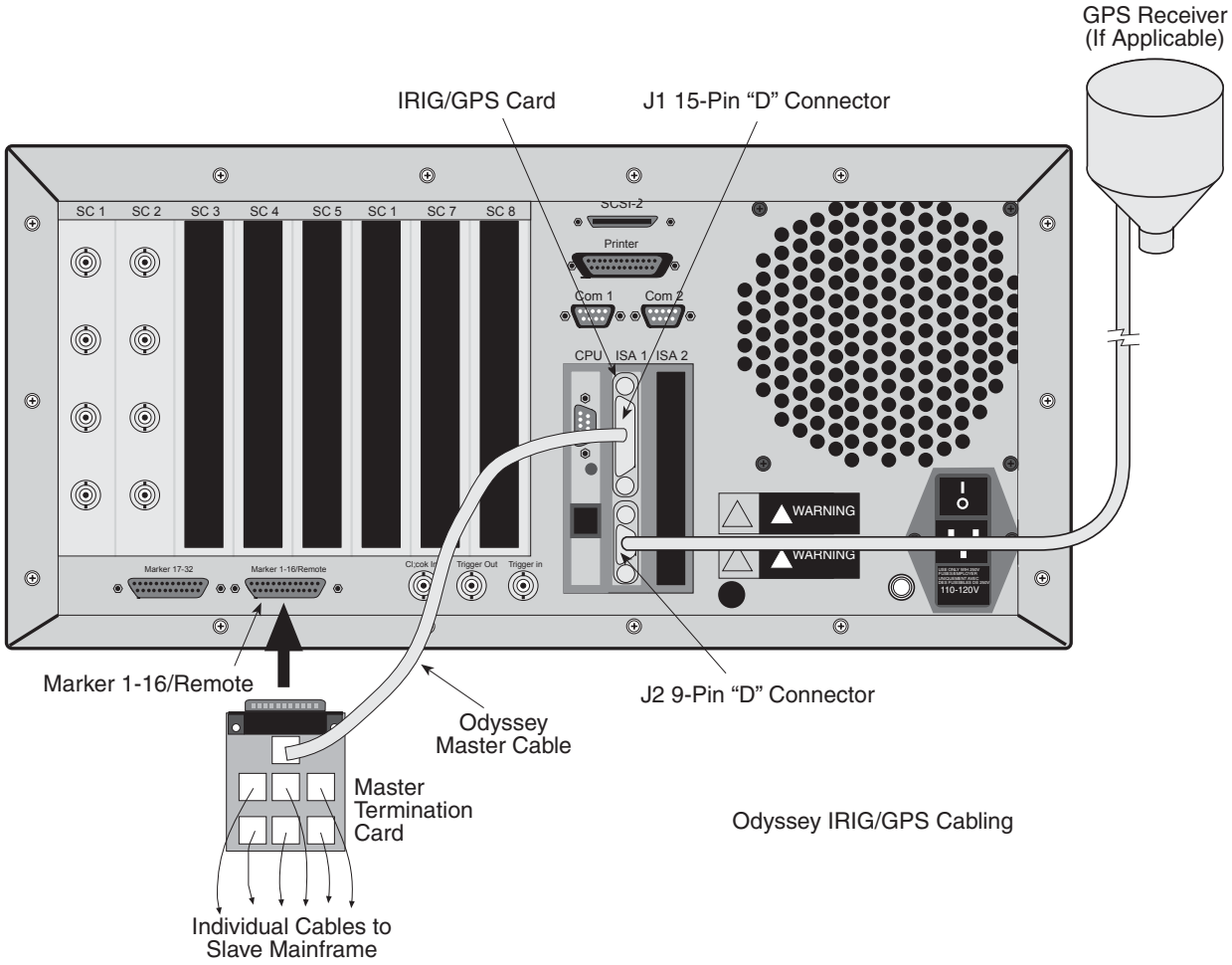
Cabling

1. Locate the Odyssey Master Cable and the small termination card supplied with the IRIG/GPS card. The termination card carries eight RJ-45 Ethernet-style connectors. (If you did not receive the IRIG/GPS card from Nicolet, you will need to purchase a cabling kit. Please contact Nicolet Technical Support for information.)
2. Install the termination card on the rear panel "Marker 1-16/Remote" connector of your IRIG/GPS-equipped Odyssey. This is the Master Odyssey.
3. Install the Master Cable from the 15-pin connector J1 on the IRIG card to the innermost connector on the termination card.
4. GPS card only: Securely mount the GPS receiver in an outdoor location where it has an unobstructed view of the sky. The GPS signals cannot penetrate foliage or structures. To provide full timing precision, the GPS receiver must lock onto at least five satellites. Route the receiver cable appropriately and connect to the 9-pin receptacle J2 on the GPS card. Note that initial satellite acquisition can require up to 20 minutes after power-on.
5. IRIG card only: Disassemble the 15-pin connector shell on the Odyssey Master cable to access the connector pins. Using suitable cabling, connect an Amplitude Modulated IRIG signal to the input pin 7 and input ground pin 8. Reassemble the connector shell and fasten to the IRIG card J1 connector.



IRIG Input Connector
Viewed From Rear

6. If you are synchronizing multiple Odyssey mainframes, one Odyssey Slave Cabling Kit is required for each Slave unit. Connect the Slave termination boards (only one RJ-45 connector) to the Slaves' "Marker 1-16/Remote" connectors. Connect the supplied cables from the Master termination board to each Slave.



Odyssey IRIG/GPS Cabling

Installing ISA Expansion Cards

CAUTION

Because the Odyssey is a fully featured PC already containing most of the common PC peripherals such as Ethernet and SCSI, it is not usually necessary to add expansion cards. Nicolet supports National Instruments ISA GPIB-TNT cards, Bancomm bc627AT GPS and bc620AT IRIG cards. More cards may be added from time to time; check with Nicolet Technical Support for information on other supported cards. Although innumerable ISA expansion cards exist, other vendors and card types are not formally supported by Nicolet and may or may not function as expected. Any damage caused to the Odyssey hardware or operating system by such cards is not covered by Nicolet warranty. Always back up your hard disk completely with a 32-bit Windows utility before installing new hardware. Many PC cards install driver software that has potential to cause conflicts and remains behind even if the card is removed.

ISA CARD INSTALLATION MUST BE PERFORMED ONLY BY SKILLED AND EXPERIENCED PC TECHNICIANS OR SYSTEM ADMINISTRATORS.

Physical Installation

The Odyssey contains two full-length ISA slots for expansion cards. Cards of up to three watts power consumption may be used. The PCI slots are used by Nicolet's high-performance acquisition cards and are not available for expansion cards. Refer to the section in this Appendix on disassembly and re-assembly for installation details if needed.

Interrupts

The Odyssey as shipped from the factory contains a full complement of Ethernet, SCSI, and COM ports. Due to the many included features and the PC limitation of 16 interrupts, no free interrupts are available in a standard Odyssey using a PCI-933 CPU card. Models using a PCI-936 CPU or later are shipped with at least one interrupt available for expansion devices. Inspect your screen at BIOS boot time to determine which CPU is installed.

To use an expansion card that requires an interrupt with the PCI-933 CPU, one of the on-board devices must first be disabled. For your particular application, one or more of the following devices is probably unnecessary and can be disabled to provide an interrupt.

SCSI Interface	Interrupt 9
Network Adapter	Interrupt 5
Com Port 2	Interrupt 4

Note: *DO NOT attempt to disable the secondary IDE controller at Interrupt 15. Windows does not allow disabling this controller, even if it is not used by the system.*

To disable a port and free its interrupt for other uses, close the Odyssey application and exit to Windows, then follow this procedure:

1. Click on the icon **My Computer** on the **Windows** desktop.
2. Click the right mouse button and select Properties from the pop-up menu.
3. In the **System Properties** box that appears, click the second tab, **Device Manager**.
4. In the listing of devices that appears, click on the plus sign [+] next to the type of device you wish to disable. (Ports, Network Adapter, or SCSI Controllers.)
5. Click on the name of the port (COM2, PCNET Adapter, or SCSI Adapter, then click the Properties button below the listing.
6. In the device **Properties** dialog that appears, un-check the white box at the bottom, Original Configuration.
7. Click **OK** twice to return to the desktop.
8. The interrupt is now free. Shut down the system and install your new ISA device.

Please note that due to the great variety of expansion cards, Nicolet is unable to offer specific technical support on any ISA cards, their installation, or any difficulties that may result. Conflicts may occur which cannot be resolved. Poorly-behaved software, particularly 16-bit Windows 3.x software, can PERMANENTLY DAMAGE the Windows operating system.

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Appendix B: Odyssey Specifications

Specifications

For current performance specifications, refer to the Odyssey Specifications document, number 169-91310x. All specifications are subject to changes and improvements without notice.

Acquisition

A system may contain from one to four acquisition cards. Each OD-100 acquisition card contains 8 analog inputs, 8 digital marker inputs and one counter/timer. Each OD-200 acquisition card contains 4 analog inputs and 8 digital marker inputs.

	OD-100 Card	**OD-200 Card**
Analog channels	8	4
Digitizer, each channel	16 bit, 100 kS/s	14-bit, 10 MS/s
Marker channels	8	8
Counter/timer channels	one per acquisition card	N/A

Memory Length Per Channel, All Channels Recording

	OD-100 Card	**OD-200 Card**
Standard	>100 Megasamples	>360 Megasamples
Extended	>400 Megasamples	>800 Megasamples
Transient Memory	N/A	2 MS or 8 MS/channel

Memory length is extended if fewer channels are recorded.

The recorded data may consist of input signals, computed traces such as CH1 * CH2 (OD-100 only) or any combination.

User units	user-specified Mx+B and label
Channel title	each channel and signal conditioner may be assigned a title for identification
Autosetup	inputs may be scanned over a time period for automatic setup of span and offset

Digital Marker Inputs

Number	8 per acquisition card, plus one from front panel button
Type	fixed threshold TTL
Slope	high, low level; positive, negative edge slope
Overvoltage protection	250 V
Input connector	44-pin "D" connectors
Minimum Pulse Width	One sample period at current Acquisition Rate

Counter/Timer Inputs (OD-100 Only)

Number	1 per OD-100 acquisition card
Type	fixed threshold TTL
Functions	count, frequency, RPM, encoder position
Maximum Count Frequency	5 MHz

DSP Calculations (OD-100 Only)

Each channel on an OD-100 card has a Digital Signal Processor (DSP) which performs real-time calculations on the incoming data.

DSP calculations may be displayed as a trace, displayed numerically, used as a trigger source, and/or stored to disk.

Waveform Math: Add, subtract, multiply or divide any two channels, invert, absolute value.

Waveform Parameter Measurements: Max, min, peak-to-peak, RMS, mean, period, duty cycle, area, slope, pulse width.

Measurements can be performed on raw data or waveform math data (e.g. average power). Calculation period may be set to a specified time period or automatically detected by threshold crossings of the input.

Data Reduction: Output at a reduced rate is implemented by storing all channels using the cycle bus instead of the internal/external clock.

Digital Filter: Selectable anti-alias filtering/decimation. Cut off frequency is selectable from ¼ to 1/40 of sampling rate at user option. “Auto” selection maintains a constant ¼ of sample rate.

Timebase

Max. digitizing rate	OD-100 card: 100,000 Samples/sec OD-200 card: 10 Msamples/sec
Min. digitizing rate	0.1 Sample/sec (10 seconds per sample)
Number of timebases	one per acquisition card; multiple cards may use the same rate or independent but synchronous rates for each
Timebase types	single rate, dual rate (slow/fast/slow), or external
Accuracy	Standard: 0.01% With optional GPS/IRIG card: $5e^{-7}$ unlocked. $5e^{-8}$ locked to GPS or IRIG source
Time stamping	start time is recorded with each recording to accuracy of PC clock, or optionally with high precision IRIG or GPS time

Trigger

Trigger may respond to analog or digital input data or DSP-computed real-time parameters (OD-100 only) described above, selected independently for each channel.

Trigger slope	positive, negative, dual
Trigger threshold	continuously variable
Trigger hysteresis	continuously variable
Trigger logic	AND/OR combination of analog, digital and counter/timer inputs; front panel manual trigger is always recognized.
Trigger actions	accelerate recording to higher acquisition rate; post data to ProView analysis software; stop after n triggers
Pre-trigger	OD-100: 10 to approximately 24,000 points for each trigger OD-200: approximately 2000 points to full transient memory
Post-trigger	OD-100: 10-64000 points after trigger event goes false OD-200: approximately 2000 points to full transient memory

Alarm

A rear-panel Alarm output may be activated by an event defined in similar fashion to the trigger event. Cold relay contacts are provided to switch up to 1A at 250V on the Marker 1-16/Remote Connector.

Display

Internal	10.4 inch (260mm) dual-backlight TFT Color
External	any size standard PC monitor displays identical simultaneous data
Modes	real-time scrolling, refresh, triggered review. oscilloscope window (OD-200 cards only)
Max scroll speed	100mm/sec (switches to refreshed mode above 50mm/sec)
Number of waveforms	up to 8 panes on each screen; up to 8 waveforms can be displayed in one pane; each pane may be freely adjusted to any height; control panels and softkeys can be turned off to maximize waveform display area
Number of screens	four user-definable display pages with instant switching between pages

Data Display While Recording

Waveform data is displayed in real-time as it is recorded. Display speed and channel settings may be changed while recording. On the OD-100 card only, one real-time parameter per channel may also be displayed numerically. Data may be captured for inspection in a separate window while recording continues; the captured data may be zoomed, post-processed and printed.

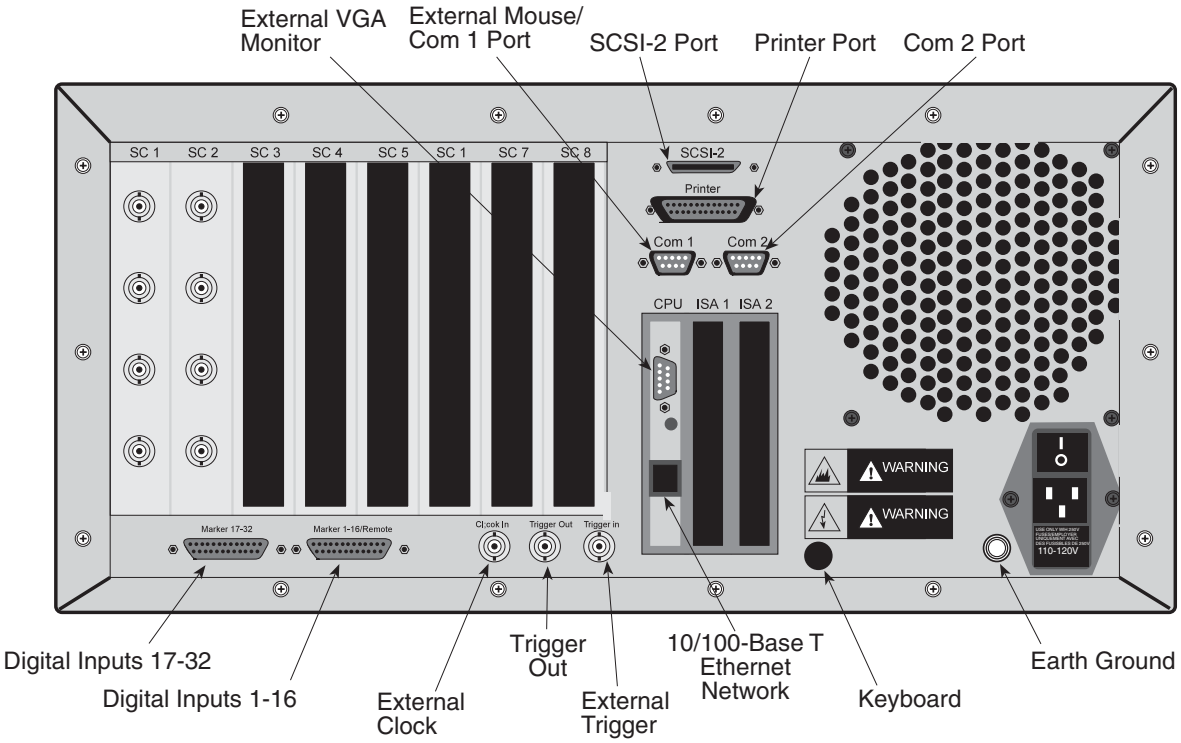
Data Display While Reviewing

Waveform data may be played back at a variable rate forward or backward, or manually scrolled with the jog/shuttle knob. A compressed overview of the entire record may be displayed. Zooming, printing and cursor measurements of all channels are available. Simple statistical parameters such as RMS and mean of a given region may be measured. For more advanced calculations, data may be sent to the ProView or imPRESSion analysis window.

Hardcopy

Plots	plot of screen contents with annotation to any local or networked Windows supported page output device; ProView or imPRESSion software can fully customize report formats to include text, numeric tables, graphics, etc.
Stripchart Writer (optional)	8.5 inch paper width thermal-array flatbed recorder; maximum output speed 100 mm/sec; also functions as a Windows page printer for extra versatility and value. Realtime rate: 10 mm/s or slower. Post-acquisition rate: 5000 m/s effective.

Rear Panel Input/Output



SCSI-2

The SCSI-2 compatible connector is used to connect a single-ended 8-bit compatible SCSI-2 peripheral to the CPU. Any SCSI-2 MDB50(Male) connector is compatible. The port is capable of burst data transfer rates of 10Mbyte/sec in synchronous mode and 5Mbytes/sec in asynchronous mode.

Pin Number	Signal	Pin Number	Signal
1	GND	26	DB0
2	GND	27	DB1
3	GND	28	DB2
4	GND	29	DB3
5	GND	30	DB4
6	GND	31	DB5
7	GND	32	DB6
8	GND	33	DB7
9	GND	34	DBP
10	GND	35	GND
11	GND	36	GND
12	Not Used	37	Not Used
13	Not Used	38	TERMPWR
14	Not Used	39	Not Used
15	GND	40	GND
16	GND	41	ATN
17	GND	42	GND
18	GND	43	BSY
19	GND	44	ACK
20	GND	45	RST
21	GND	46	MSG
22	GND	47	SEL
23	GND	48	C/D
24	GND	49	REQ
25	GND	50	I/O

Printer

The parallel port is a multi-mode parallel port supporting the following modes. This connector is compatible with any standard DB25(male) connector. The modes are controlled as defined in the AMBIOS setup program.

Standard Parallel Port (SPP)

This bi-directional mode is IBM XT/AT and PS/2 compatible. This is the Odyssey's default mode.

Signal	Flow	Pin Number	Pin Number	Flow	Signal
STROBE*	Out	1	14	Out	AUTOFD*
Data 0	I/O	2	15	In	ERROR*
Data 1	I/O	3	16	Out	INIT*
Data 2	I/O	7	17	Out	SELECTIN*
Data 3	I/O	5	18	-	GND
Data 4	I/O	6	19	-	GND
Data 5	I/O	7	20	-	GND
Data 6	I/O	8	21	-	GND
Data 7	I/O	9	22	-	GND
ACK*	In	10	23	-	GND
BUSY	In	11	24	-	GND
PE	In	12	25	-	GND
SELECT	In	13			

Note: * active low signal

Enhanced Parallel Port (EPP) Mode

Signal	Flow	Pin Number	Pin Number	Flow	Signal
WRITE*	Out	1	14	Out	DATASTB*
Data 0	I/O	2	15	-	Not Used
Data 1	I/O	3	16	-	Not Used
Data 2	I/O	7	17	Out	ADDRSTB*
Data 3	I/O	5	18	-	GND
Data 4	I/O	6	19	-	GND
Data 5	I/O	7	20	-	GND
Data 6	I/O	8	21	-	GND
Data 7	I/O	9	22	-	GND
INTR	In	10	23	-	GND
WAIT*	In	11	24	-	GND
Not Used	-	12	25	-	GND
Not Used	-	13			

Note: * active low signal

Extended Capability Port (ECP) Mode

Signal	Flow	Pin Number	Pin Number	Flow	Signal
STROBE*	Out	1	14	Out	AUTOFD*, HOSTACK(2)
Data 0	I/O	2	15	In	FAULT*(1), PERIPHRQST*(2)
Data 1	I/O	3	16	Out	INIT*(1), REVERSERQST* (2)
Data 2	I/O	7	17	Out	SELECTIN*(1,2)
Data 3	I/O	5	18	-	GND
Data 4	I/O	6	19	-	GND
Data 5	I/O	7	20	-	GND
Data 6	I/O	8	21	-	GND
Data 7	I/O	9	22	-	GND
ACK*	In	10	23	-	GND
BUSY, PERIPHACK(2)	In	11	24	-	GND
PERROR, ACKREVERSE (2)	In	12	25	-	GND
SELECT	In	13			

Note 1: Compatible Mode

Note 2: High Speed Mode

Note: * active low signal

Com1

Serial Port 1 is normally reserved for the Mouse, and is 100% compatible with the RS-232 IBM-AT serial port definition. Any DB9F connector is compatible.

Signal	Flow	Pin Number	Pin Number	Flow	Signal
DCD*	In	1	6	In	DSR*
RX	In	2	7	Out	RTS*
TX	Out	3	8	In	CTS*
DTR*	Out	4	9	In	RI*
GND	-	5			

Note: * active low signal

Com2

Serial Port 2 is normally reserved for user serial communications, and is 100% compatible with the RS-232 IBM-AT serial port definition. Any DB9F connector is compatible.

Signal	Flow	Pin Number	Pin Number	Flow	Signal
DCD*	In	1	6	In	DSR*
RX	In	2	7	Out	RTS*
TX	Out	3	8	In	CTS*
DTR*	Out	4	9	In	RI*
GND	-	5			

Note: * active low signal

Video Out

The video out connector is located on the CPU Board. Any compatible DB15 high-density male connector such as the AMP HD-22 series can be used. The output is compatible with standard PC monitors.

Pin Number	Signal	Pin Number	Signal	Pin Number	Signal
1	RED	6	GND	11	Not Used
2	GREEN	7	GND	12	Not Used
3	BLUE	8	GND	13	HSYNC
4	Not Used	9	Not Used	14	VSYNC
5	GND	10	GND	15	Not Used

Marker 1-16/Remote

The Marker 1-16 connector is a 44-pin D sub connector used to connect digital inputs for acquisition cards 1 and 2. Any AMP HD22 series 44-pin D (Male) connector is compatible. The minimum pulse width is one sample period at the current acquisition rate. Spare connectors are available from Nicolet as part number 117-901100.

Pin Number	Signal	Pin Number	Signal	Pin Number	Signal	
1	EVENT 1	16	EVENT 16	31	Not Used	
2	EVENT 2	17	GND	32	Not Used	
3	EVENT 3	18	GND	33	Not Used	
4	EVENT 4	19	GND	34	Not Used	
5	EVENT 5	20	GND	35	EXT STOP	
6	EVENT 6	21	GND	36	EXT START	
7	EVENT 7	22	GND	37	Not Used	
8	EVENT 8	23	GND	38	RLY NC	Alarm output
9	EVENT 9	24	GND	39	RLY COM	
10	EVENT 10	25	GND	40	RLY NO	
11	EVENT 11	26	GND	41	GND	
12	EVENT 12	27	GND	42	GND	
13	EVENT 13	28	GND	43	EXT PWR	
14	EVENT 14	29	GND	44	EXT PWR	
15	EVENT 15	30	GND			

Notes: EVENT 1-EVENT 8 reside on the first OD-100 acquisition card. For OD-200, see note on next page.

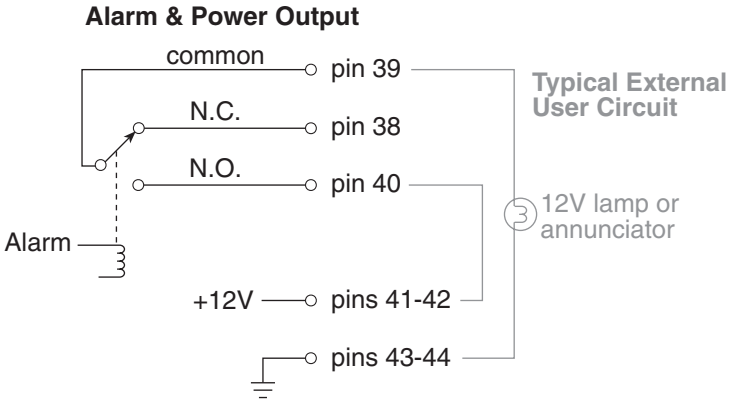
EVENT 9-EVENT 16 reside on the second OD-100 card. For OD-200, see note on next page.

EXT PWR is 12V rated at 500mA maximum total from both marker connectors. It is protected by an internal fuse.

EXT START and EXT STOP both have internal 10 K ohm pull-up resistors and must be driven to a TTL-compatible low level for a minimum of 200 milliseconds to actuate the start/stop function. To use the external controls, select **External Start** and/or **Stop** in the *Configure..Acquisition* dialog.

Female Connector Viewed From Odyssey Rear Panel

The three RLY pins 38-40 are the Alarm Output. An isolated relay connects the NO and COM pins while the Alarm condition is true. When false, the NC and COM pins are connected. On later systems, the relay is activated by a one-shot oscillator for approximately 150 msec to assure that even the shortest alarm pulse is recognized. The relay contacts are rated at 250V, 1A.



MARKER INPUT SPECIFICATIONS

Input Type: TTL logic level, threshold approximately +1V

Minimum Pulse Width: one sample period at current acquisition rate

Safe Overload: 250V

Input Impedance: 10 kohms to ground

Open Circuit Voltage: <0.2V, low state

Pullup resistor (if required): 20 kohms to pin 43 or pin 44

OD-200 MARKER INPUTS

Note: *Due to the technical requirements of high speed signal routing, the marker inputs of the OD-200 acquisition card appear in reverse order of the OD-100. This is clearly labeled in the user interface.*

First OD-200 card (A): Event 25 to Event 32
Second OD-200 card (B): Event 17 to Event 24
Third OD-200 card (C): Event 9 to Event 16
Fourth OD-200 card (D): Event 1 to Event 8

Marker 17-32

The Marker 17-32 connector is a 44-pin D sub connector used to connect digital inputs for acquisition cards 3 and 4. Any AMP HD22 series 44-pin D (Male) connector is compatible.

Pin Number	Signal	Pin Number	Signal	Pin Number	Signal
1	EVENT 17	16	EVENT 32	31	Not Used
2	EVENT 18	17	GND	32	Not Used
3	EVENT 19	18	GND	33	Not Used
4	EVENT 20	19	GND	34	Not Used
5	EVENT 21	20	GND	35	Not Used
6	EVENT 22	21	GND	36	Not Used
7	EVENT 23	22	GND	37	Not Used
8	EVENT 24	23	GND	38	Not Used
9	EVENT 25	24	GND	39	Not Used
10	EVENT 26	25	GND	40	Not Used
11	EVENT 27	26	GND	41	GND
12	EVENT 28	27	GND	42	GND
13	EVENT 29	28	GND	43	EXT PWR
14	EVENT 30	29	GND	44	EXT PWR
15	EVENT 31	30	GND		

Notes: EVENT 17-EVENT 24 reside on the third OD-100 acquisition card. For OD-200, see note on previous page.

EVENT 25-EVENT 32 reside on the fourth acquisition card. For OD-200, see note on previous page.

EXT PWR is 12V rated at 500mA maximum total from both marker connectors.

Clock In

The CLOCK IN BNC connector is used during External Clock mode. The Odyssey constantly samples input data at the full digitizer rate. On each rising edge of CLOCK IN, the most recent sample is stored into the data stream. Typically the CLOCK IN signal would be associated with a rotary encoder generating pulses every N-degrees of rotation. This allows data samples to be associated with rotary position as opposed to absolute time.

The clock input is TTL-compatible. The maximum external clock rate is 50 kHz for the OD-100 card, 1 MHz for the OD-200 card. The minimum pulse width for each clock is 10 microseconds for the OD-100 card, 100 ns for the OD-200 card.

Trig In

The Odyssey responds to triggers applied to the TRIG IN BNC connector.

The TRIG IN input is TTL-compatible. The minimum pulse width is one sample at the current acquisition rate.

Trig Out

The Odyssey generates triggers on the TRIG OUT BNC connector.

The TRIG OUT output is TTL-compatible.

Post-Processing Software

If you require the ultimate in processing flexibility and power, the Nicolet Odyssey may be equipped with optional ProView or imPRESSion analysis software. Operating as a separate window, ProView and imPRESSion receive data from the Odyssey recorder either manually or automatically. No cumbersome file storage, translation or exporting is required; data is transferred at a keystroke directly between applications over the high-speed PCI bus. ProView includes a suite of analysis functions which may be combined and automated in a Formula Database. Its integrated page layout produces professional reports in full color that include your waveforms, calculation tables and graphics. You go "from sensor to report" in a fully integrated environment. ImPRESSion software adds more powerful spectral and filtering features plus more extensive programmability.

Odyssey Offline software may also be installed on any Windows 95, 98, NT 4.0, ME, 2000 or higher Pentium PC for off-line viewing and printing of Odyssey data files. Combined with ProView analysis software, it offers a complete waveform analysis and technical report workstation.

Remote Control Software

Nicolet remote control software allows you to control any number of remote Odysseys from your PC using Compaq Microcom's Carbon Copy 32 software.

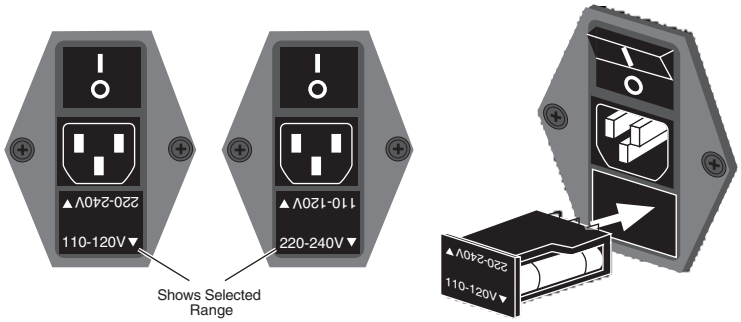
Connection	supports wired, modem, TCP/IP, Windows for Workgroups, Novell ipx/spx links
Operating system	remote PC must run Microsoft Windows 3.11, 95, 98, NT 4.0, ME, 2000 or higher
Functions	Control of Odyssey functions, view Odyssey display (not real-time), redirect printer output to remote PC, transfer files, keyboard chat with remote operator

Electrical Specifications

Power supply	100, 120, 230, 240 VAC ± 10%, 50 - 60 Hz. 12V inverter available for in-vehicle operations up to 16 channels
Power consumption	8 channels 200W, 32 channels 350W typical; 450W maximum
Fuse Time-lag	7A for 100, 120 to 132 VAC, 4A for 230, 240 VAC

All inputs and outputs tested for EMI/RFI immunity to 2000V.

Fuses



The Odyssey contains a set of line fuses in the power cord receptacle. To change the fuse, pry the fuse holder from the instrument using a small screwdriver. Replace the fuses, if necessary, and reinsert the fuse holder orientated as required for your power source.

WARNING

FIRE HAZARD! Replace fuse(s) with same type and ratings.

Physical Specifications

Odyssey Standard Mainframe:

Dimensions: 47 cm width x 24 cm height x 56 cm length (18.5 x 9.5 x 22 inches)

Weight: Approximately 22 kg (45 pounds)

Acquisition Cards: Up to 4

Signal Conditioner Cards: Up to 8

Ruggedized Odyssey "R" Mainframe:

Dimensions: 47 cm width x 24 cm height x 39 cm length (45 cm including folding keyboard) (18.5 x 9.5 x 15.5 (17.75) inches)

Weight: Approximately 18 kg (40 pounds)

Acquisition Cards: Up to 2

Signal Conditioner Cards: Up to 4

Environmental Specifications

Operating temperature	10-40 degrees C.
Shock	Odyssey: 4 G max for 11 msec Ruggedized Odyssey "R": 20 G max for 11 msec
Vibration	Odyssey: 2 G, 22-350 Hz Ruggedized Odyssey "R": 5 G, 22-350 Hz

All specifications are subject to changes and improvements.

Appendix C:
Nicolet AR200P Stripchart Writer Operation Instructions

The Nicolet AR200P Thermal Array Writer functions as both a Windows page printer and as a continuous-feed stripchart writer for the Odyssey data acquisition system. Our optional PC software Odyssey Offline and DataViewer also support stripchart output to the AR-200P.

Installation

If you have just received a new writer, you must install the printer driver supplied with it. Insert the AR200P floppy disk in your Odyssey or PC. From the Windows Start menu, select Settings, then Printers, and double-click Add Printer. When asked to select your printer, click Have Disk and OK. Browse to the floppy drive A: if necessary. "AR200P 8-inch Recorder" will be displayed. Follow the prompts until installation is finished, including printing a test page.

Printing a Single Page

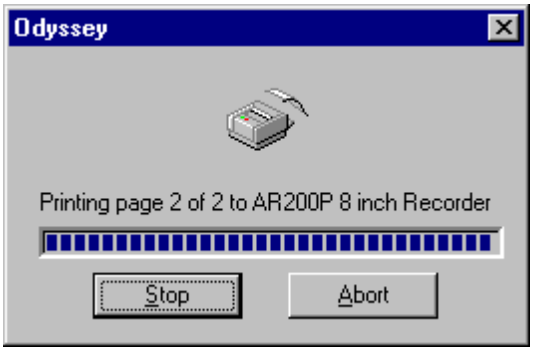
The AR200P acts as a Windows page printer for any application including the Nicolet Odyssey. To print the current screen contents from your Odyssey, press the front panel Plot button or use the menu File…Print Display.

Printing a Continuous Stripchart

After you have captured your data, Odyssey can send waveform data to the stripchart writer or send back-to-back pages to any Windows printer. The pages will contain the same channels and composition as the current screen. At low speeds, Odyssey can also write to a stripchart during recording, or print one recording while making another.

Starting and Stopping the Writer

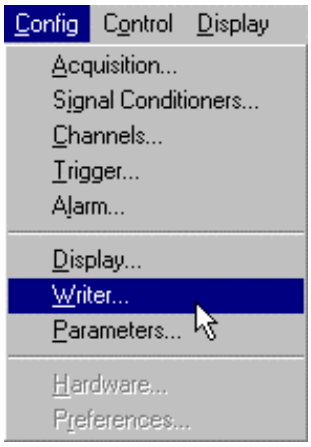
When you press the front panel Writer button, printing begins at the left edge of the screen and continues until the Stop condition you selected in the Writer dialog. To stop printing before the job is ended, press the Writer button again or click Stop in the printing dialog below.



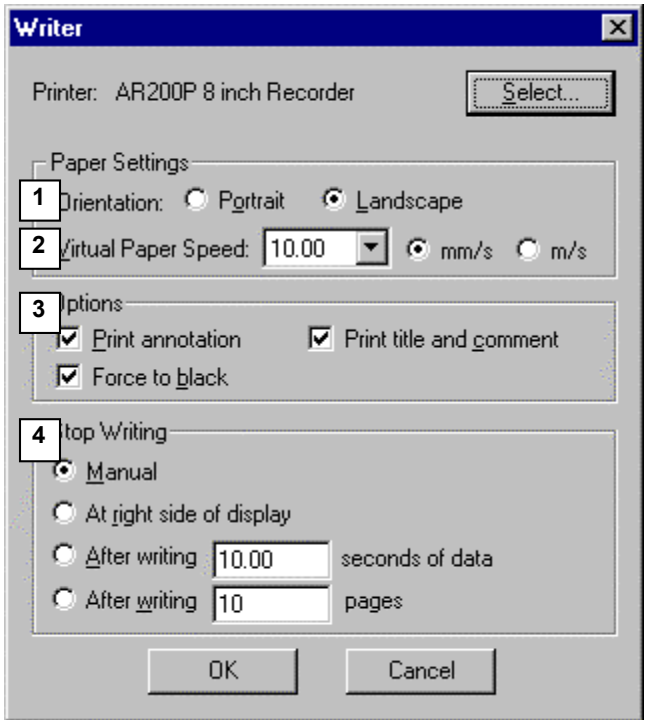
When you manually stop printing, the Windows Print Spooler may still contain several pages which will continue to print until finished. If you prefer more immediate control, turn off the Spool Setting in the Printer Properties dialog.

Writer Configuration

To set up the stripchart output, select Writer from the Config menu.



The Writer Configuration dialog appears as shown below.



In the Writer dialog, first click the Select button to choose the AR200P 8 inch Recorder. All the printers currently installed are available through the Select button. For continuous stripchart output, the AR200P writer or other continuous-feed printer is required. Other Windows printers may be used to produce consecutive back-to-back pages.

1. Select the **Orientation** (**1**). **Portrait** prints waveforms in the tall orientation to get the greatest vertical detail. **Landscape** prints in the wide orientation to get the greatest amount of time on a page. You must use only the **Landscape** setting for the stripchart writer.

2. Select the **Virtual Paper Speed** (**2**). A slow speed condenses time information on the paper for a longer-duration overview of your recording. For example, a speed of 1mm/s is equivalent to 10 seconds/cm, or about 5 minutes per page. A fast speed expands time to show greater detail of your signals. For example, a speed of 10m/s is equivalent to 1 millisecond/cm, faster than a light-beam oscillograph.

3. Select the print options (**3**). **Print annotation** causes a time scale and channel names to be printed continuously. **Print Title and Comment** causes the Recording title and comments to be printed on the first page. **Force to Black** should be selected for monochrome printers, or unchecked to allow full-color printing on color printers.

4. Select Stop **Writing** options. The writer output always starts from the left edge of the screen. You can select several different conditions for stopping. **Manual** writes continuously until the end of the recording or until you press the **Writer** button again. **At right side of display** writes for the duration of the current screen only. You can compose the screen's time span by changing the Expand/Compress Time Scale controls.

After writing n seconds of data stops writing after the number of seconds indicated. **After writing n pages** stops after writing the number of pages indicated.

5. Click the **OK** button when finished making settings. Your printer is now ready. To begin printing press the front panel **Writer** button, or select the menu command ***Control…Start Writer***.

Printing While Recording

To print the current recording in progress, your **Virtual Paper Speed** must be low enough to allow the printer to finish one page before the next becomes available. This depends primarily on your printer's throughput. The Nicolet AR-200P can provide continuous output at speeds of 10 mm/s and slower. A good starting point for other Windows printers is 1 mm/s, which allows about five minutes per page. When you press the **Writer** button, the Odyssey will wait until a new page of data has been collected, then send it to the writer, repeating indefinitely until you press the **Writer** button or the stop condition is met.

You may also print previously-made recordings while a new recording is in progress. Under the Display menu, select **Mode…Split Horizontal**. In the **Review** window on the left side of the split, you can now recall any past recording for review and printing.

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Appendix D:
Export File Formats and Data Exchange

Export File Formats

The Nicolet Odyssey exports data in many popular formats for easy exchange with other programs. This Appendix contains a brief description of the different formats available. Fully detailed information on the Nicolet ASCII, WFT and TEAM formats is provided so the user may open and read the files in their own software, using the programming environment of their choice. For more detailed information on the other file formats, refer to documentation supplied by the respective software vendors.

ASCII

The ASCII format is the most general-purpose and easy to import in other applications. Virtually all programs on any computing platform can easily deal with ASCII data tables. Export options allow inclusion of an information header, channel titles, and a column of time values. All exported channels are included as individual columns in one file, with a choice of tabs, spaces or comma delimiters between values.

One drawback to ASCII format is large file sizes. Each data point is scaled in engineering units and written to disk as ASCII characters, typically consuming nine or ten bytes for each data word. The optional x-axis information consumes an additional 14 bytes per sample. A sample of a two-channel ASCII export with all optional fields is shown below.

If some channels are sampled at a lower rate than others, their columns contain no entries and consume no space for the “missing” samples. A blank cell is indicated by two consecutive delimiters.

```
File:    C:\Program Files\Odyssey Offline\ASCII.txt
Created: Wednesday, September 03, 2000 11:35:28
Title:   B & S Test 7

Time              Sound       Vibration
0.000000E+000     0.136067    -0.087800
1.000000E-005     0.119800    -0.040533
2.000000E-005     0.118400    0.001867
3.000000E-005     0.124333    0.048333
4.000000E-005     0.126200    0.077067
```

DADiSP

DADiSP is a signal analysis software from DSP Development of Cambridge, MA. The Odyssey uses a simple DADiSP ASCII-based import format with keywords recognized by DADiSP. Each channel is placed in a separate file. An example of an output file is shown below.

```
DATASET B & S Test 7
SIGNAL Sound
DATE 12-13-2000
TIME 10:29:40.00
VERT_UNITS Volt
HORZ_UNITS s
INTERVAL +1.000000E-05
DATA
+1.360667E-01
+1.198000E-01
+1.184000E-01
+1.243333E-01
+1.262000E-01
```

DATS

This is a proprietary binary file format used by DATS analysis software. It contains all channels in a single export file, consuming four bytes per sample. The standard file extension is .DAC.

DIA-PC

This is a proprietary file format used by DIA-PC analysis software. It produces two files for each export, with four-byte binary data words from all channels in a file of extension .R32 and a small separate header information file of extension .DAT.

FAMOS 3.0

Famos is a signal analysis software produced by imc of Germany. It contains all channels in a single export file, consuming four bytes per sample. The standard file extension is .DAT.

FlexPro 4.0

This is the file format used by the PC analysis software FlexPro 4.0. The default extension is .FPD. To export in this format, you must either:

- have FlexPro installed on your Odyssey system, or
- copy the FlexPro template file EMPTY.FPD from your FlexPro workstation into the Odyssey directory C:\WINDOWS\ShellNew\.

HP SDF 3.0

This is the Hewlett Packard Standard Data Format, version 3.0. It stores all channels in a single file with the default extension .TIM, using a compact two-byte data format.

ImPRESSion 5.0

This format is used by Nicolet imPRESSion software. Unlike most software, it supports multi-rate data so Recordings made using the Odyssey Dual Rate feature can be saved as one file with full time precision. Exporting to imPRESSion may be convenient if you are processing a number of Recordings. For a single transfer, the Odyssey's Analyze Data functions include an even more convenient single-click transfer to imPRESSion without the need for export and import operations.

MATLAB

MatLab is a popular programming and mathematical analysis software produced by MathWorks. Its format contains all channels in a single export file, consuming four bytes per sample. Optionally, an additional vector of time-axis values can be included in the export. The standard file extension is .MAT.

nCode

nCode is a fatigue analysis software produced by nSoft Inc. Its export format produces a separate file for each channel in the recording, with the default extension .DAC. Data is in a four-byte floating-point format.

Somat EASE

This is the format used by EASE stress analysis software by Somat. It stores all channels in a single file with the default extension .SIF, using a four-byte data format.

TEAM

TEAM format is a multi-channel file used by Nicolet transient recorders and by Nicolet TeamPro and ProView software. Data from all channels is stored in four-byte IEEE-754 format to a single file along with information about the recording, channel titles, and scaling factors. Complete documentation of the TEAM format is found below to enable the user to open and extract information directly from these files.

All TEAM applications, including ProView, use or support the binary TEAM format for storage of waveforms on disk. When multiple recorders are used the data from each recorder is written to a separate file. One datafile can contain multiple channels and multiple records (blocks/sweeps). Also each record can have multiple segments as present in a multi-timebase recording. Programmers writing their own data analysis software can access these files. A main advantage of the usage of the TEAM format is the availability of additional information in the file such as technical units, date and time etc. This document describes in detail the complete format.

Data File Layout and Size

A TEAM data file consists of an X-HEADER, followed by a Y-HEADER for each stored channel, followed by a number of data records. The data is stored as integers (16-bit) or floats (32-bit). Optionally digital and segmentation information may be appended after the data records. The X-HEADER has a length of 256 bytes, and each Y-HEADER has a length of 32 bytes. As an example the layout of a file containing 2 channels with 2. records per channel and 100 integer samples per record, is depicted below.

FILE LAYOUT EXAMPLE		
Bytes	**Contents**	**Comments**
256	X-HEADER	General information
32	Y-HEADER	Y-HEADER Channel 1
32	Y-HEADER	Y-HEADER Channel 2
200	DATA	100 Samples, Channel 1, Block 1
200	DATA	100 Samples, Channel 1, Block 2
200	DATA	100 Samples, Channel 2, Block 1
200	DATA	100 Samples, Channel 2, Block 2
Optional digital information and data		
Optional segmentation information		

The file size can be calculated using the following formula:

File size (bytes) = 256+NCHAN * 32+NCHAN * NREC * NSAMP * SAMPTYPE

- NCHAN = number of stored channels.
- NREC = number of records per channel.
- NSAMP = number of stored samples per record.
- SAMPTYPE = number of bytes per sample.

When digital and/or segmentation information is present the length of the file is increased accordingly, as described in the appropriate sections.

Header Layout

VARIABLE TYPES USED

· **BYTE**: unsigned character in value range 0 through 255

· **INT**: integer (16 bit);

· **LONG**: long integer (32 bit);

· **FLOAT**: single precision IEEE-754 floating point number (32 bit);

· **DOUBLE**: double precision IEEE-754 floating point number (64 bit);

· **CHAR[n]**: a string of n-1 characters (each character is one byte) terminated by 0;

LAYOUT X-HEADER		
Byte #	**Format**	**Contents**
0-1	INT	HEADER VERSION
2-3	INT	NCHAN
4-5	INT	NREC
6-9	LONG	LENGTH
10-13	LONG	NSKIP
14-17	LONG	NSAMP
18-19	INT	SAMPTYPE
20-27	CHAR[8]	XUNITS
28-35	DOUBLE	X0
36-43	DOUBLE	XSTEP
44-49	CHAR[6]	DATE-INFO
50-51	INT	NEVENTS
52-53	INT	NSEGMENTS
54-57	LONG	SEGMENTOFFSET
58-65	CHAR[8]	SEGMENTSXUNITS
66-69	LONG	RECINFOOFFSET
70-255	Reserved	(0)

The variable types are the same as used by Intel (co-)processors. Storage of a multibyte variable is in the order least significant byte first to most significant byte last (Intel format).

LAYOUT Y-HEADER		
Byte#	**Format**	**Contents**
0-6	CHAR[7]	NAME
7-13	CHAR[7]	YUNITS
14-17	FLOAT	Y0
18-21	FLOAT	YSTEP
22-25	FLOAT	MAX
26-29	FLOAT	MIN
30-31	Reserved	(0)

Explanation of Header Entries

The various entries in the headers fully describe the data contained in the remainder of the file. Each entry will now be explained in more detail.

X-HEADER Entries

HEADER-VERSION This *integer* must be 1. Otherwise the file is not a TEAM datafile.

NCHAN This *integer* defines the number of stored channels in the file.

NREC This *integer* defines the number of stored records per channel in the file.

LENGTH This *long integer* represents the original record length. When for instance from a 4K recording only samples 101 to 300 were stored, this value would be 4096 (=4K).

NSKIP This *long integer* is set to the number of samples skipped in the original record during data storage. When for instance from a 4K recording only samples 101 to 300 were stored, this value would be 100 indicating that the first 100 samples were skipped during storage.

NSAMP This *long integer* determines the number of samples stored in each record in the file. When for instance from a 4K recording only samples 101 to 300 were stored, this value would be 200.

SAMPTYPE This *integer* defines the type of samples stored in the records and can be:

2 The data type of each sample is 16-bit integer (**INT**).

4 The data type of each sample is single precision IEEE-754 32-bit floating point number (**FLOAT**).

XUNITS This *character string* contains the x-units information, for instance "seconds" or "Hz". When this is a multi-timebase file, this entry will be "sample" and the true x-units for each segment is located in the variable SEGMENTSXUNITS.

X0 This *double precision floating point* value is the X-value (for instance time relative to the trigger point) corresponding with the first sample in the original (!) record from which the data has been stored. So the X-value of the first sample in the *stored* record is:

X1-value = X0 + NSKIP*XSTEP.

XSTEP This *double precision floating point* value defines the difference in X-value between two consecutive samples. With XSTEP, X0 and NSKIP the X-value of sample *i* in the stored record can be calculated by the formula:

Xi-value = X0 + (NSKIP+i-1)*XSTEP

DATE-INFO This *"character string"* contains the date and time at which the recording was finished. The precision of this time is 1 second. The info consists of 6 characters (NOT 5) which must be treated as 6 unsigned bytes (range 0-255). The numbers stored in these bytes have the following meaning:

Byte 1 **hours** in the range 0 to 23

Byte 2 **minutes** in the range 0 to 59

Byte 3 **seconds** in the range 0 to 59

Byte 4 **years** since 1980

Byte 5 **month** in the range 1 to 12

Byte 6 **day** in the range 1 to 31

NEVENTS This *integer* defines the number of stored digital (event) channels.

NSEGMENTS This *integer* defines the number of segments. It also signals whether this file contains multiple segments: when this value equals zero (0) the file does not contain multiple segments. Otherwise the value will be 2 or 3.

SEGMENTOFFSET This *long integer* is the byte offset in the file where the segment information starts. It is additional information to ease the location of this information.

SEGMENTSXUNITS This *character string* contains the x-units information, for instance "seconds" when this is a multi-timebase file.

RECINFOOFFSET This *long integer* is the byte offset in the file where the recording information starts. It is additional information to ease the location of this information.

Y-HEADER Entries

NAME This *character string* contains the channel name. The character string is terminated by a 0.

YUNITS This *character string* contains the technical units of the data. The character string is terminated by a 0.

Y0 This *single precision floating point* value is used for scaling the integer data samples.

YSTEP This *single precision floating point* value is used for scaling the integer data samples. The Y-value (Yv) in technical units can be calculated from each data sample-value (Dv) by the formula:

Yv = Y0 + YSTEP*Dv

MAX This *single precision floating point* value contains the maximum data sample value which can be encountered in the stored data. This value is 32768.0 for integer data. MAX and MIN can be used for scaling plots of the data without the need to scan the data for the maximum and minimum first.

MIN This *single precision floating point* value contains the minimum data sample value which can be encountered in stored data. This value is -32768.0 for integer data.

Digital (Event) Information

The digital (event) information is stored after the analog data. This information is a separate block with its own header and data. The layout of this block is as shown in the following table:

DIGITAL DATA EXAMPLE		
Bytes	**Contents**	**Comment**
16	NAME	Name of first digital channel
16	NAME	Name of second digital channel
-	-	-
16	NAME	Name of n-th digital channel
N	DATA	DIGITAL DATA

The number of bytes N is determined by the following calculation:

N= NSAMP x NREC x IntegerValueOf{(NEVENTS-1)/16+1} x 2

Header layout

The header information has a length equal to: **NEVENTS x 16 (bytes)**

Data layout

The data is stored in the file as 16-bit integers as follows:

DIGITAL DATA EXAMPLE															
Channel Number (bit 16 ... 1)															
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
RECORD # 1 (LENGTH = NSAMP)															
--															
RECORD # NREC (LENGTH = NSAMP)															
Channel Number (bit 16 ... 1)															
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
RECORD # 1 (LENGTH = NSAMP)															
--															
RECORD # NREC (LENGTH = NSAMP)															

Segmentation Information

The segmentation information is stored after the digital data. It is only present when the NSEGMENTS entry in the X-header is nonzero. The number of segments describe the logical division of the data records into multiple segments, each with their own specific horizontal (time) scaling. Typically a multi-timebase recorder generates data records with several segments for each timebase used.

The segmentation information section contains NSEGMENTS segment information blocks of 32 bytes each. The layout of each segment information block is as shown in the following table:

LAYOUT SEGMENT INFORMATION BLOCK		
Byte #	**Format**	**Contents**
0-3	LONG	SEGM_SKIP
4-7	LONG	SEGM_NSAMP
8-15	DOUBLE	SEGM_X0
16-23	DOUBLE	SEGM_XSTEP
24-31	Reserved	(0)

SEGMENT INFORMATION BLOCK entries

SEGM_SKIP This *long integer* defines the number of samples to skip in each data record before the samples belonging to this segment start. E.g. SEGM_SKIP of the first segment will be typically 0 (zero), while SEGM_SKIP of the second segment will be equal to SEGM_NSAMP of the first segment.

SEGM_NSAMP This *long integer* defines the number of samples in this segment.

SEGM_X0 This *double precision floating point* value is the X-value (for instance time relative to the trigger point) corresponding with the first sample in this segment.

SEGM_XSTEP This *double precision floating point* value defines the difference in X-value between two consecutive samples. With SEGM_XSTEP and SEGM_X0 the X-value of sample *i of this segment can be calculated by the formula:*

Xi-value = SEGM_X0 + (i-1)*SEGM_XSTEP

Recording Information

The recording information is stored after the segmentation information. It is only present when the RECINFOOFFSET entry in the X-header is nonzero.

The recording information section contains NREC+1 recording information blocks of 32 bytes each. The first block contains the ASCII string "BLOCKINFORMATION"and 16 bytes of trailing zeros. The layout of each subsequent recording information block is as shown in the following table:

Layout RECORDING INFORMATION BLOCK		
Byte #	**Format**	**Contents**
0-7	DOUBLE	TRIGGER_TIME
8	BYTE	TRIGGER_YEAR
9	BYTE	TRIGGER_MONTH
10	BYTE	TRIGGER_DAY
11-31	Reserved	(0)

RECORDING INFORMATION BLOCK entries

TRIGGER_TIME This *double precision floating point number* defines the trigger time. The trigger time is defined as the time elapsed in seconds after midnight. The resolution and accuracy of this value depend on the timing device in use. E.g. when using the PC clock, resolution is 55 milliseconds. When using special timing boards, e.g. IRIG, higher resolution and accuracy are possible.

TRIGGER_YEAR This *unsigned character* defines the number of years elapsed since 1900 in the range 0 to 255, e.g. 95 (5F**hex**) for 1995 and 110 (6E**hex**) for the year 2010.

TRIGGER_MONTH This *unsigned character* defines the month of the year in range 1 to 12, e.g. 6 for June.

TRIGGER_DAY This *unsigned character* defines the day of the month in range 1 to 31.

UFF Type 58 (ASCII)

This option saves data in the popular "Universal File Format" Type 58. This format was originally developed for the U.S. Air Force Wright Avionics Lab and documented in the specification AFWAL-TR-873069 volume 5. The beginning of a file sampled at 100kS/s is shown below.

```
-1
    58
Y-t function
B & S Test 7
13-Dec-2000 11:29:40.000000
NONE
NONE
    0         0    0         0 NONE               1   2 NONE               1   2
         2      1001         1 0.00000E+000 1.00000E-005 0.00000E+000
        17    0    0    0 Time                 sec
         1    0    0    0 Sound                Volt
         0    0    0    0 NONE                 NONE
         0    0    0    0 NONE                 NONE
 +1.36067E-01 +1.19800E-01 +1.18400E-01 +1.24333E-01 +1.26200E-01 +1.21133E-01
 +1.13000E-01 +1.13267E-01 +1.28733E-01 +1.53267E-01 +1.74600E-01 +1.76133E-01
 +1.55067E-01 +1.29667E-01 +1.21333E-01 +1.42533E-01 +1.78133E-01 +1.98400E-01
 +1.88067E-01 +1.51000E-01 +1.06333E-01 +6.83333E-02 +4.03333E-02 +2.74667E-02
 +3.36667E-02 +6.38000E-02 +1.15733E-01 +1.73400E-01 +2.22067E-01 +2.52133E-01
```

UFF Type 58 (Binary)

This option provides data in a more compact binary form of the Universal File Format. The header information is similar to that shown above but the data is stored in four-byte binary form rather than thirteen ASCII characters for each sample.

Wave Sound

Wave sound is a simple file format used by Microsoft Windows to store audio information. It saves one or two channels of data in 16-bit integer format. The files contain no knowledge of scale factors, channel titles, etc. The default file extension is .WAV. An export option allows resampling of high-speed Odyssey data to standard WAV sample rates of 44.1 kHz, 22.05 kHz etc. to allow playback on any PC sound card. The original sample rate of 100 kHz, 50 kHz, etc. may also be retained but may not be supported by PC audio software.

Normally each channel is stored in a separate (monophonic) WAV file, but an export option permits creation of two channel (stereo) files. In this case, the user may select which Odyssey channel occupies the left channel of each export file. Just as with the mono files, one file is produced for every channel, but the left channel is identical in each. This feature makes it very convenient to compute transfer functions from a common forcing function channel to many response channels.

WFT

The Nicolet WFT format is a compact 16-bit binary file format containing an ASCII header to retain scale factors, channel titles, time/date, etc. It is used by all Nicolet digital oscilloscopes and is supported by a variety of software. Each channel is stored in a separate file of 2-byte integers. It is the most compact export format. The WFT format is documented in detail below so the user can open and extract data directly.

Waveform File Specifications

File Header

The WFT file header size is determined by the value entered in the field "Header_Size." The individual file header fields are fixed in length and are ASCII alphanumeric strings, each terminated by a null (00) byte.

The simplest file, containing a single timebase, will have a header of 1538 bytes. A file containing multiple waveform segments or multiple timebases will expand the header length as needed.

All fields are left justified ASCII character strings, followed by a null byte, followed by spaces if needed to fill the allotted space. If a particular field is not used, its first byte is a null byte.

Since the header contains only ASCII characters and ends with a CONTROL-Z character, the header text can be conveniently viewed on a PC screen by using the MS-DOS "TYPE" command, for example "TYPE WAVE0001.WFT <Return>."

Data Type

"Integer" means an ASCII whole number, for example "2" or "262144." Note that the values are not limited to a 16-bit range: the "Time" field, in milliseconds since midnight, may contain a number as large as 89,400,000.

"Character" means ASCII text, for example "V" or "Test #12."

"Float" means an ASCII number in scientific notation, for example "5.0000000E-6."

Actual Data

The actual data (raw data) follows immediately after the file header. The data is in binary format. Please note that the data type (number of bytes per point, and byte sex) are described in the file header.

In all applications to date, data is in a 16-bit integer range from -32768 to +32767, with the low byte appearing first.

Raw data is converted into time and voltage values by the calculations shown below.

Time = ((point# * HORIZONTAL_NORM) + HORIZONTAL_ZERO) * USER_HORIZONTAL_NORM + USER_HORIZONTAL_ZERO point# = Represents the n-th point in a sweep. HORIZONTAL_NORM = Time per point, in seconds. HORIZONTAL_ZERO = Trigger to 1st point, in seconds. USER_HORIZONTAL_NORM = User defined multiplier, unitless (normally 1) USER_HORIZONTAL_ZERO = User defined time offset, in seconds (normally 0)
Volts = ((data - VERTICAL_ZERO) * VERTICAL_NORM) * USER_VERTICAL_NORM + USER_VERTICAL_ZERO data = Raw digitizer data (-32,768 through 32,767) VERTICAL_ZERO = Absolute zero reference from the ADC VERTICAL_NORM = Voltage per level USER_VERTICAL_NORM =User defined multiplier (normally 1) USER_VERTICAL_ZERO = User defined offset in volts (normally 0)

Offset	Max. Size (Bytes)	Field Description	ASCII Data Type	Field Description
0	2	Nic_id0	Integer	CPU type ID (byte sex) 1 = VAX, 2 = 68000, 3 = Intel: normally 3
2	2	Niv_id1	Integer	Nicolet division indicator: always 2
4	2	Nic_id2	Integer	Nicolet file format: 1 = Time domain, 2 = Frequency domain
6	2	User_id	Integer	User ID
8	12	Header_size	Integer	Length of file header in bytes
20	12	File_size	Integer	Length of file in bytes
32	12	File format version	Integer	Version of file format
44	81	Waveform title	Character	Waveform title
125	3	Date_year	Integer	Date of trigger of segment #1 - year
128	3	Date_month	Integer	Date of trigger of segment #1 - month
131	3	Date_day	Integer	Date of trigger of segment #1 - day
134	12	Time	Integer	Time of trigger of segment #1 - msec since midnight
146	12	Data_count	Integer	Total number of data points
158	12	Vertical_zero	Integer	Data value at which the voltage value is 0.00 volts - VZERO
170	24	Vertical_norm	Float	Voltage magnitude between levels - VNORM
194	24	User_vertical_zero	Float	User voltage offset
218	24	User_vertical_norm	Float	User units per volt
242	11	User_vertical_label	Character	User vertical label: default = "V"
253	24	User_horizontal_zero	Float	User time offset
277	24	User_horizontal_norm	Float	User seconds per unit
301	11	User_horizontal_label	Character	User horizontal label: default = "s"
312	129	User_Notes	Character	Note field, additional information
441	196	Audit	Character	Audit array of all calculations
637	21	Nicolet_Digitizer_Type	Character	Nicolet digitizer description
658	3	Bytes_per_data_point	Integer	Amount of bytes to store 1 data point: normally 2
661	3	Resolution	Integer	Number of active bits in a data point
664	81	Forward_link	Character	Pathname/file following in time the current file (Note 1)
745	81	Backward_link	Character	Pathname/file preceding in time the current file (Note 1)
826	3	Process flag	Integer	Process Flag - # of memory altering math functions performed
829	3	Data compression	Integer	Type of data compression used on raw data: 0 = none
832	12	Number of segments	Integer	Number of segments
844	12	Length of each segment	Integer	Length of each segment
856	12	Number of timebases	Integer	Number of timebases per segment

Offset	Max. Size (Bytes)	Field Description	ASCII Data Type	Field Description
868	156	Reserved N/A	N/A	Reserved for Nicolet internal use only
1024	12	Length of zone 1	Integer	Length in points of zone 1
1036	24	Horiz. norm. zone 1	Float	Time between data points (tpp) - HNORM
1060	24	Horiz. zero zone 1	Float	Time of 1st point in zone 1 with respect to trigger
1084	12	Length of zone 2	Integer	Length in points of zone 2 (Note 1)
1096	24	Horiz. norm. zone 2	Float	Time between data points (tpp) - HNORM (Note 1)
1120	24	Horiz. zero zone 2	Float	Time of 1st point in zone 2 with respect to the trigger (Note 1)
1144	12	Length of zone 3	Float	Time between data points (tpp) - HNORM (Note 1)
1156	24	Horiz. norm zone 3	Float	Time between data points (ttp) - HNORM (Note 1)
1180	24	Horiz. zero zone 3	Float	Time of 1st point in zone 3 with respect to the trigger (Note 1)
1204	332	Reserved N/A	N/A	Reserved for Nicolet internal use only
1536 (Note 2)	24	Segment #2 HDELTA	Float	Time value of 1st point relative to time of 1st point of seg. #1
1560 (Note 2)	24	Segment #3 HDELTA	Float	Time value of 1st point relative to time of 1st point of seg. #1
1584 (Note 2)	24	Segment #4 HDELTA	Float	Time value of 1st point relative to time of 1st point of seg. #1
1608 (Note 2)	24	Segment #5 HDELTA	Float	Time value of 1st point relative to time of 1st point of seg. #1
1632 (Note 2)	24	Segment #6 HDELTA	Float	Time value of 1st point relative to time of 1st point of seg. #1
1656 (Note 2)	24	Segment #7 HDELTA	Float	Time value of 1st point relative to time of 1st point of seg. #1
1680 (Note 2)	24	Segment #8 HDELTA	Float	Time value of 1st point relative to time of 1st point of seg. #1
1704 (Note 2)	24	Segment #9 HDELTA	Float	Time value of 1st point relative to time of 1st point of seg. #1
1536 + (24 * (n-2))	24	Segment #n HDELTA	Float	Time value of 1st point relative to time of 1st point of seg. #1
Header_Size - 2	1	End of HDELTA's	Null	
Header_size - 1	1	End of readable file	Control Z	End of readable data - Raw data follows
Header_size	Data_Count	Start of raw data	Raw	Binary data: normally 16-bit words in two's compliment arranged in low byte/high byte order
File_size - 1	Data_Count * Bytes_per_data_point	End of raw data		

Note 1: Not used, reserved for future use.
Note 2: These fields are presently only in multi-waveform files.

Odyssey Native File Format

For sophisticated users who wish to directly access the Nicolet Recording files from their own programs, Nicolet provides full documentation and sample programs. When copied to Windows media, Odyssey recording files carry the extension .NRF. By necessity they are a complex structure which supports any number of channels, multiple sample rates, unlimited setting changes during recording, unlimited triggered segments of variable size, various search indexes and the many other powerful Odyssey features. The files are organized internally by Microsoft DCOM programming tools as a collection of objects. Therefore unlike simple traditional flat files, direct file reads at pre-determined byte locations are not used to locate information. Instead, Nicolet supports much more convenient access to the Recording structure through an open published software interface. This allows you to read and manipulate the data without any need to understand the intricacies of the file structure. Data is available in several convenient formats: compact integer, normalized floating point values, summarized max/min information from the entire record, and even resampled to any given rate. A full Software Development Kit (SDK) is included in your Odyssey in a directory named NRF Reader SDK. It contains PDF documentation and sample programs that you can install on your computer.

The examples are written in Visual Basic for easy readability but the techniques may be used in any programming environment that supports Microsoft's COM or DCOM. This includes almost all popular languages such as National Instruments' LabView, MATLAB, Microsoft's Visual Basic, Visual C++, Visual Basic for Applications, Borland's Delphi, etc. Additional examples are available on the Nicolet Web site www.niti.com.

Data Exchange With Other Applications

Data acquisition is rarely the end result of a testing process. Data interchange, further analysis and report preparation are usually required to complete the task. The Odyssey provides several means for sharing information with other programs.

Data Export

For transferring large amounts of data, the Odyssey can save acquired data in numerous file formats. Either an entire recording or selected areas of interest may be written to disk or network. The Windows operating system in the Odyssey supports a wide variety of removable storage devices, networks and communication protocols, so interchange with almost any PC, workstation, mini-computer or mainframe is straightforward. Refer to the *Export* section in Chapter 6 for instructions on using the File…Export functions, or to the previous section for information on the file formats available.

Export techniques are most useful in these conditions:

- When large amounts of data must be transferred
- When data must be transferred to non-Windows systems
- When the Odyssey cannot easily be connected by network or modem

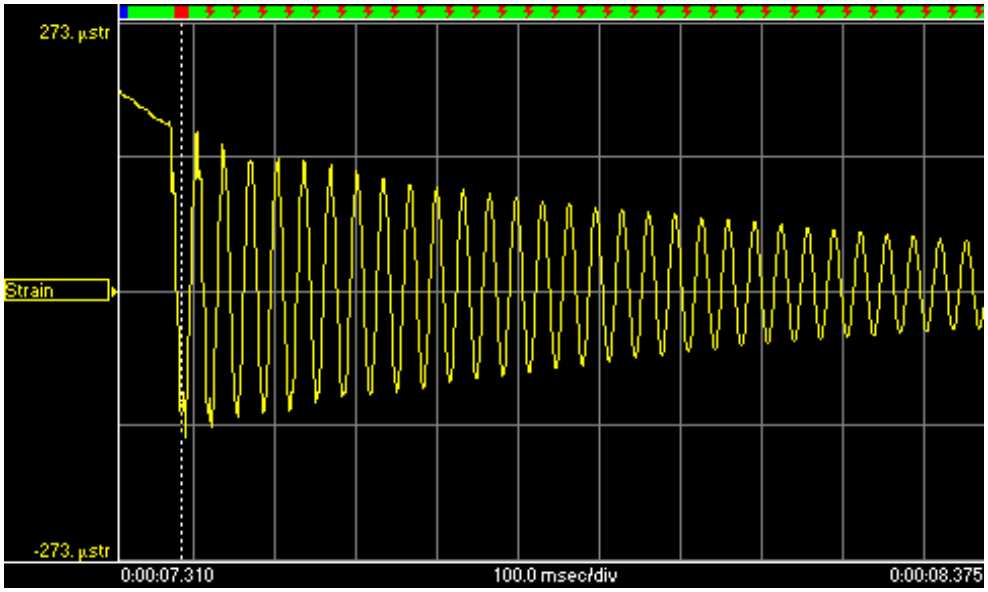
Windows Copy/Paste Techniques

Windows supports interchange of text, numeric or graphic data by use of Copy and Paste operations with the familiar Clipboard. Odyssey offers several types of interchange via the Windows Clipboard.

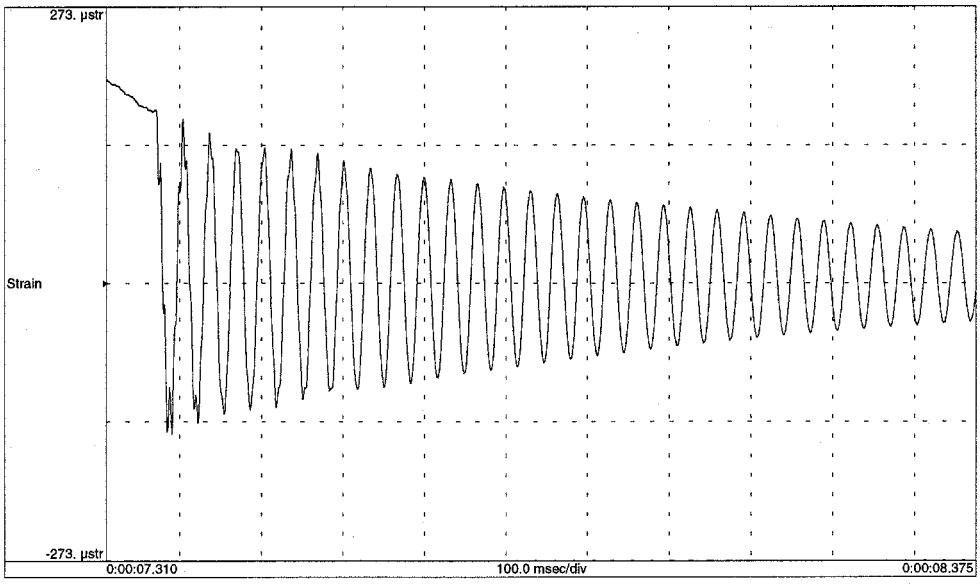
Waveform Display

In the Odyssey menu bar, the Edit…Copy command copies the current waveform display to the Windows Clipboard in two graphical formats. Most Windows applications support the Bitmap format. A Paste operation will insert a color bitmap image identical in size and appearance to the Odyssey waveform display, including channel names and numerics. Some applications also support the Enhanced Metafile format, and a Paste or Paste Special operation will insert a monochrome vector-graphics image of the Odyssey display. Unlike the Bitmap format, the Metafile format may be freely resized without distorting the image.

Copying the Waveform display is most useful when waveform images are to be included in a technical report. The following is an example of a bitmap image copied from the Clipboard.

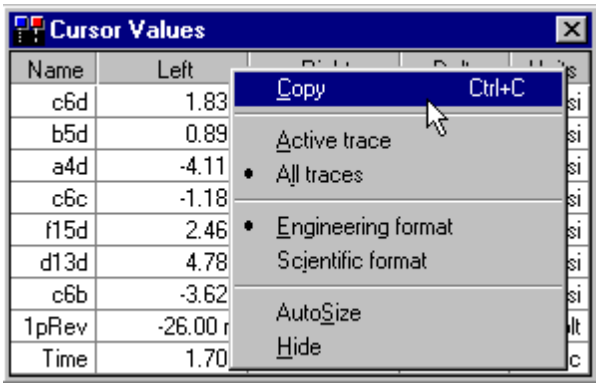


The following is an example of Metafile image copied from the Clipboard.



Cursor Values Display

The Odyssey Cursor Values box displays the name and values of each channel at the cursor locations. It may be viewed by clicking the Toolbar icon for Cursor Values or by pressing the keyboard Space bar. To copy its values, click the right mouse button anywhere in the box to call the context menu below.



Select **Copy** from the context menu to copy the Cursor Values to the Clipboard. They may then be pasted into any other program by a Paste operation. An example in a Microsoft Word table is shown below.

Microsoft Word Table				
c6d	1.833	-1.571	3.404	ksi
b5d	0.895	1.657	762.7 m	ksi
a4d	-4.113	1.225	5.339	ksi
c6c	-1.188	1.811	2.999	ksi
f15d	2.468	-2.287	4.755	ksi
d13d	4.787	2.827	1.960	ksi
c6b	-3.620	0.335	3.955	ksi
1pRev	-26.00 m	-06.33 m	19.67 m	Volt
Time	1.703	5.438	3.735	sec

To retain full numeric precision in voltage and time when copying to a spreadsheet, the use of Scientific format is recommended. Most spreadsheets do not recognize time values with fractional seconds such as 11:22:33.456.

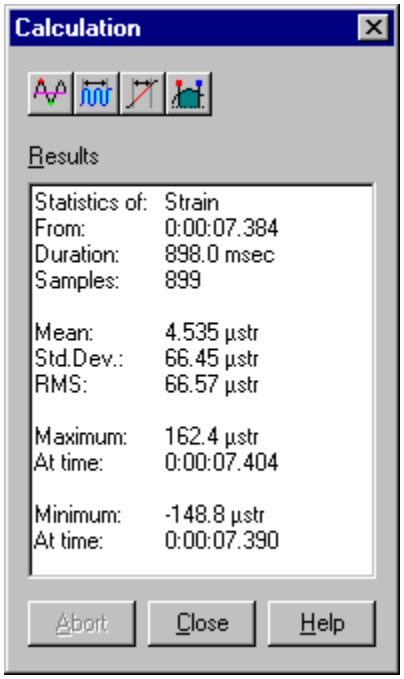
This technique is most useful when a few key values along the waveforms are of interest. In conjunction with the GoTo features, local maxima and minima can be found and copied with just a few keystrokes.

Waveform Calculator Display

The Odyssey Waveform Calculator makes about twenty key measurements on the data between cursors. The results window contains text results which may pasted into other applications. To copy Calculator results, follow this procedure:

1. Run the Waveform Calculator. An example of the result box is shown below.
2. Click and drag the mouse across the results text to select it, in standard Windows style.
3. Press **Control – C** on the keyboard or click the right mouse button and select **Copy** to copy the text to the Clipboard.
4. Switch to your other application and perform a Paste operation. An example in a Microsoft Word® table is shown below.

This technique is most useful when some numerical analysis of the waveshapes is desired without resorting to external analysis programs.



Microsoft Word Table	
Statistics of:	Strain
From:	0:00:07.384
Duration:	898.0 msec
Samples:	899
Mean:	4.535 µstr
Std.Dev.:	66.45 µstr
RMS:	66.57 µstr
Maximum:	162.4 µstr
At time:	0:00:07.404
Minimum:	-148.8 µstr
At time:	0:00:07.390

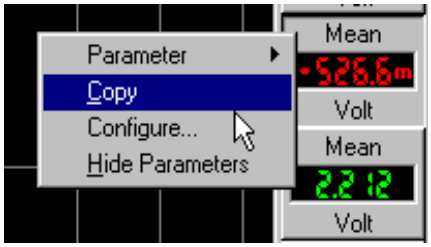
Parameter Displays

The Odyssey OD-100 acquisition cards contain a Digital Signal Processor in each channel that can compute waveform parameters in real time. These parameters may be copied to other applications, either statically by a Paste technique or dynamically by a Paste Link technique. This powerful ability allows real-time data reduction such as RMS, Max, Min, or Mean values to be computed by the Odyssey, then automatically posted to other Windows programs. For example, if data is Linked to Microsoft Excel® it can be continuously plotted, tested against acceptable limits, and used as an input to further calculations. Simple experiment control systems can be easily constructed using these techniques. To copy Parameters to other programs, follow this procedure:

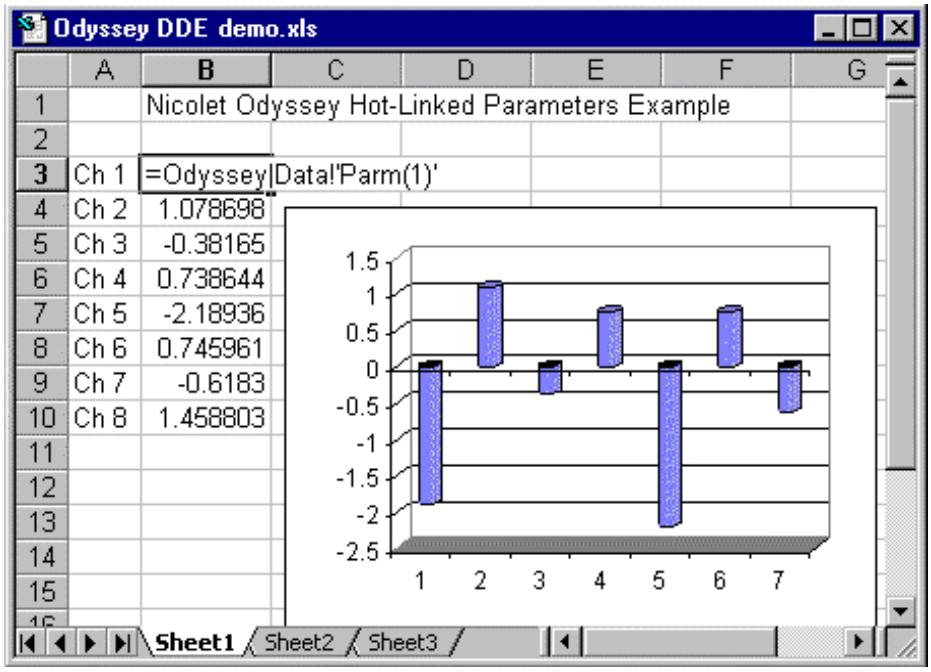
1. Set the Odyssey to compute and display one or more Parameters. Refer to the *Channels* section in Chapter 8 for instructions, if required.
2. Click the right mouse button on a Parameter display.
3. Select Copy in the pop-up menu as shown below.
4. Switch to your other application and perform a Paste operation to insert the current Parameter value. It is a fixed value that will not be updated.

5. To insert a continuously updating "hot-link", perform a Paste Special operation and select Paste Link. Some programs may allow this in a single operation. About once a second, Odyssey will update the link with a new reading.

An example of Odyssey parameters dynamically linked to an Excel spreadsheet is shown below. When the Odyssey recorder is running in Pause or Record modes, the Parameters are updated continuously. (There are no updates in Stop or Replay.)



The following is an example of an Excel spreadsheet including hot-linked Odyssey parameters.



Performance Tip: The Odyssey scrolling waveform display is very video-intensive. If the scrolling display is not required for your purposes, CPU performance will be improved by minimizing the Odyssey window or resizing it to a smaller area. This allows your other applications to run faster.

Advanced Interchange Techniques

For knowledgeable users who are experienced in Dynamic Data Exchange (DDE) techniques, Odyssey offers some simple remote control as well as data interchange features. With some programming in Visual Basic, Visual Basic for Applications or other language, DDE commands and queries can be sent to Odyssey. The controlling application may reside on the Odyssey PC itself, or may use NetDDE to communicate with a remote Odyssey via a network. The DDE techniques are described below.

For more advanced programmers or system integrators, Nicolet offers an optional Odyssey API. This provides full control and data access in any programming language that supports Microsoft's Component Object Model (COM/DCOM). Your program can run on the Odyssey itself or on any PC on your network. Please contact Nicolet for further details.

For real-time output of parameters, the programmer uses the DDE command:

Application: ODYSSEY
Topic: DATA
Item: PARM(1), PARM(2), …PARM(32)

Odyssey sends a DDE post advise at one-second intervals to avoid congesting the communication channel. The most current reading of each channel's Parameter measurement is supplied each second. If the current value of the input is desired (rather than a computed parameter such as RMS), simply set the Parameter to a Mean value of one or more points.

For control of basic Odyssey functions, the programmer uses the commands:

Application: ODYSSEY
Topic: CONTROL
Item: [START]

Starts the Odyssey recorder, identical to pressing the front panel **Start** button.

Item: [STOP]

Stops the Odyssey recorder, identical to pressing the front panel **Stop** button.

Item: [STANDBY]

Places the Odyssey in **Pause** mode, where signals are monitored and displayed but not recorded. Parameters are computed and available for DDE posting, but no data is recorded and no acquisition disk space is consumed. The Odyssey acts as a front end for your program.

Item: [TRIGGER(ON)], [TRIGGER(OFF)]

Sends a **Trigger** command to the Odyssey, identical to pressing the front panel **Trigger** button. Because the controlling Windows program is asynchronous with the Odyssey collection, it must be assured that the **Trigger** is **ON** for at least one Odyssey sample period. In practical terms, this becomes significant at low sample rates. Note that triggers must be enabled in the Configure Acquisition dialog in order for triggers to be accepted. The Odyssey recorder must be in **Record** mode for triggers to have an effect; see the [START] command above.

Item: [MARKER(ON)], [MARKER(OFF)]

Sends a Mark command to the Odyssey, identical to pressing the front panel Mark button. Because the controlling Windows program is asynchronous with the Odyssey collection, it must be assured that the Mark is ON for at least one Odyssey sample period. In practical terms, this becomes significant only at low sample rates.

Item: [SetTitle(new recording title)]

Sets the title for the next recording, identical to typing a title in the Configure Acquisition dialog. The new title takes effect when the next recording is started.

Item: [DeleteRecording(recording name)]

Deletes a recording from the Odyssey acquisition disk(s). Note that in order to free disk space, the most recent recording must be deleted, then the previous, etc.

The following is a Visual Basic for Applications example that starts and stops recording in the Odyssey. It was written in Microsoft Excel. Additional examples are available on the Nicolet web site www.niti.com.

```
Sub StartOdyssey()
    SendDDECommandToOdyssey ("[Start]")
End Sub

Sub StopOdyssey()
    SendDDECommandToOdyssey ("[Stop]")
End Sub

Sub SendDDECommandToOdyssey(szCommand$)
    Dim lDDEChannel As Long
    Dim lResult As Long

    lDDEChannel = DDEInitiate("Odyssey", "Control")
    Application.DDEExecute lDDEChannel, szCommand$
    DDETerminate lDDEChannel
End Sub
```

Blank page.

Appendix E: Service Information

This Appendix contains additional service information for your Odyssey. A Calibration Check is contained in the first part and a list of replaceable subassemblies is in the second part.

Calibration Check

This procedure describes a method of testing and verifying DC calibration accuracy for incoming inspection or routine test purposes. This example is based on the Odyssey Basic Amplifier but is applicable to all other signal conditioners by substituting the appropriate voltage ranges. (For the Odyssey Bridge Amplifier, select the Differential amplifier mode in the Completion menu, and provide 1 megohm resistors from both the positive and negative inputs to ground.)

Recommended Intervals

The Nicolet Odyssey should be tested and if necessary, calibrated, at one year intervals or after any major repair that may affect calibration.

Equipment Required

Precision DC voltage source of the following characteristics:

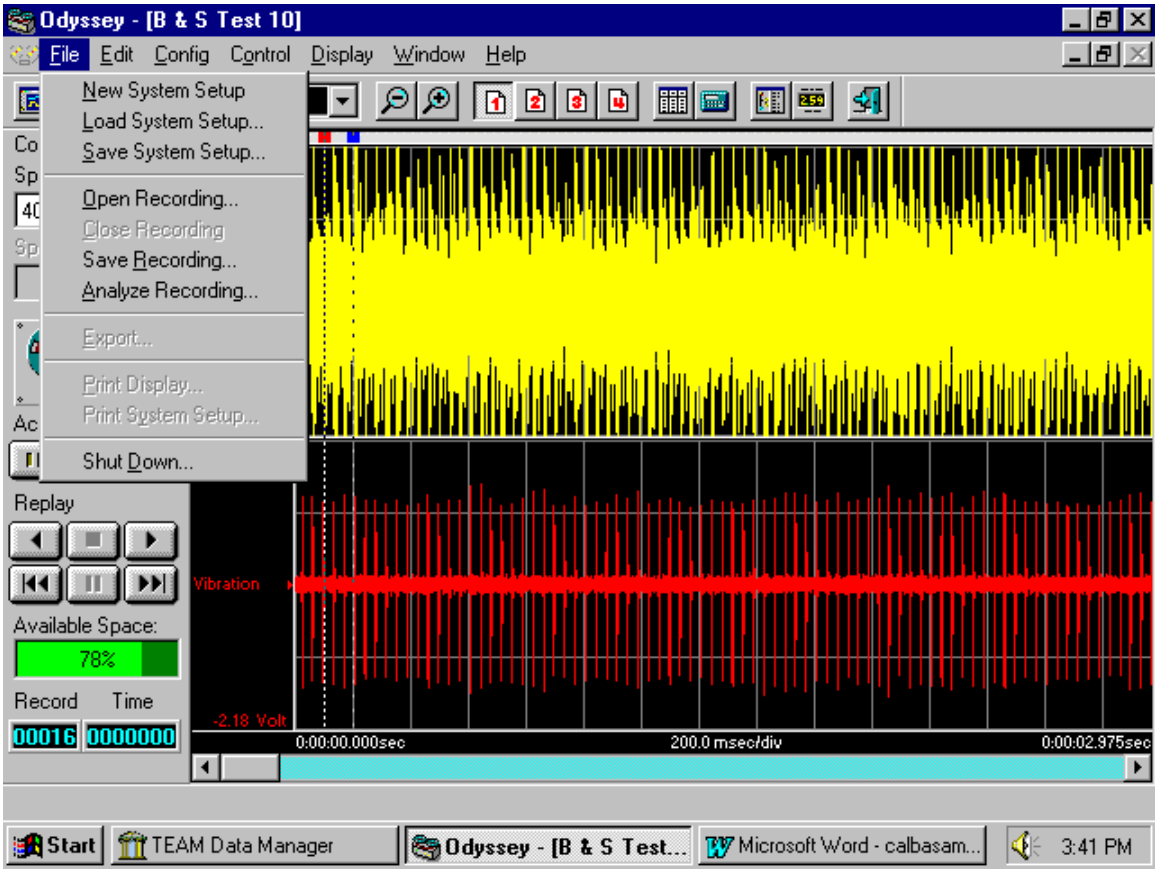
Accuracy:	0.005% or better
Output Range:	+/-5 mV to +/-10 V (all amplifiers except isolated)
	+/-5 mV to +/-500 V (for isolated amplifiers)
Example:	Data Precision 8200 (with HP3458A meter), Fluke 5700A

Warm Up

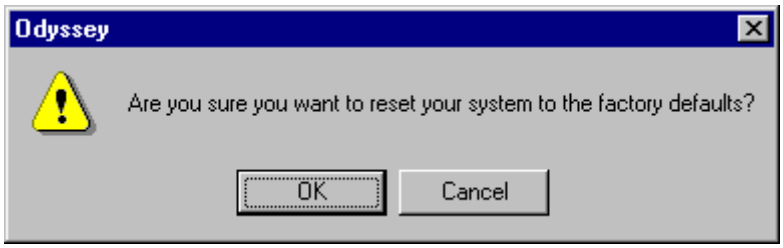
Calibration tests should be performed at normal room temperature and humidity, approximately 21-23 degrees C. and less than 80% relative humidity. The instrument should be allowed to warm up for one hour before calibration tests.

Calibration Test Procedure

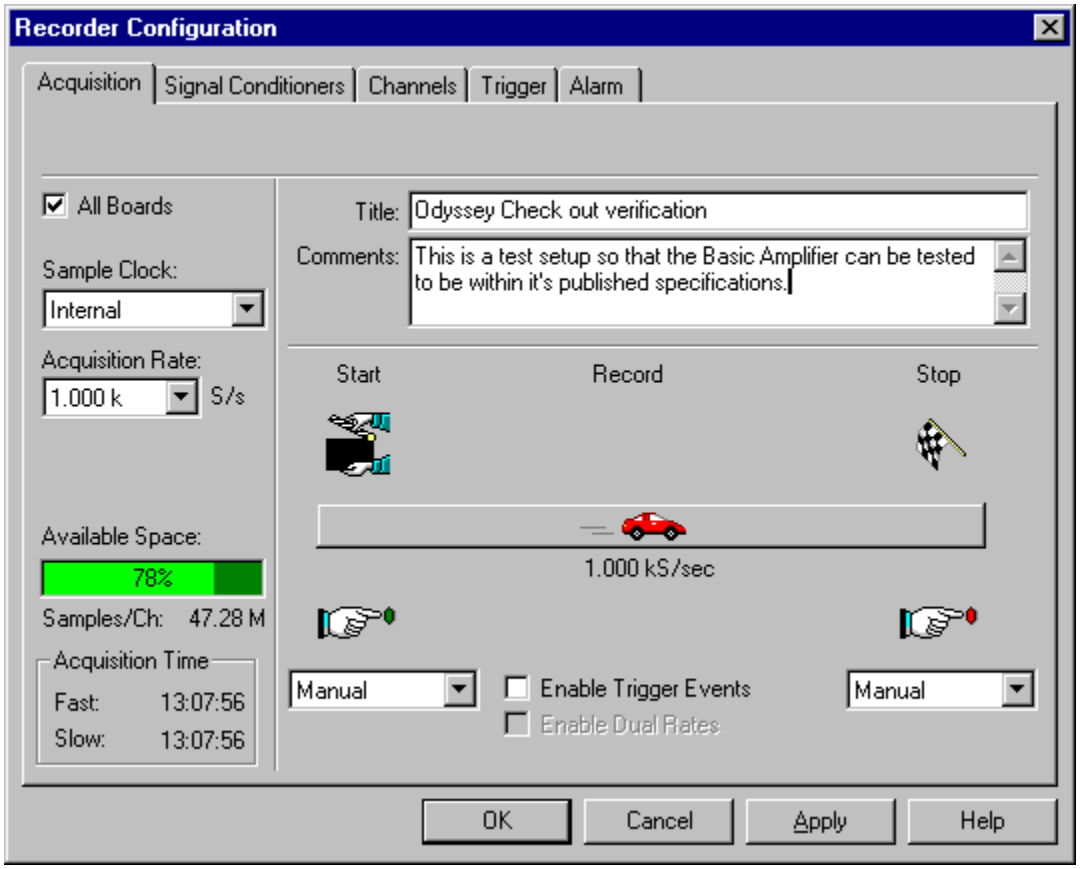
Step 1: Set the basic amplifier to its default settings by selecting **File…New System Setup** from the main menu. *(Reference Odyssey Data Acquisition System Operation Manual, Tutorial section page 5-* ***New System Setup****.)*



Click OK when this message appears.

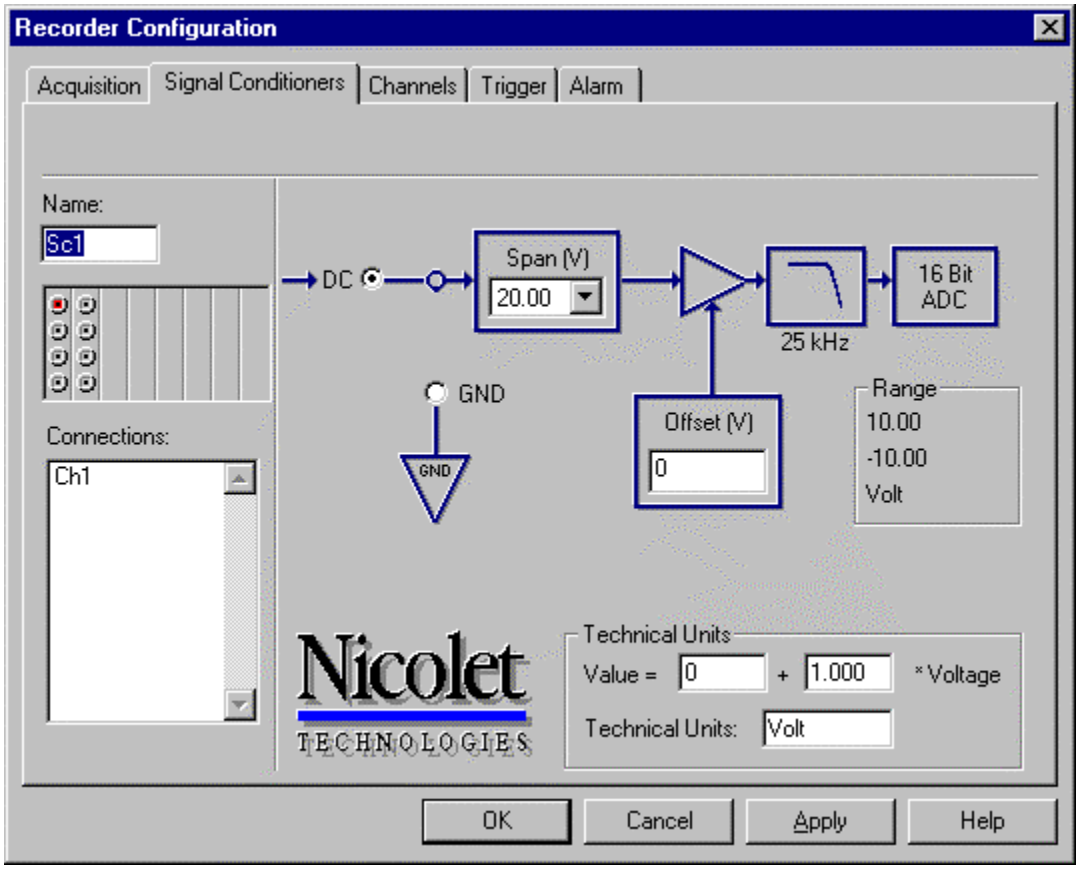


Step 2: Click on the **Config** menu of the main Odyssey window and select **Acquisition**. Place a title in the Title display so that a reference can be made for collection later.



Step 3: Click on the next Configuration tab **Signal Conditioners**. Click on each input connector symbol in turn and select the voltage **Span** to be verified. This example uses the 20 V Span on the Basic Amplifier.

Note: *Gain for each range is determined by high-precision fixed components. Testing of one Span setting is sufficient to verify proper operation of your Odyssey. If your organization's procedures require it, you may optionally test each Span setting with a similar procedure for a comprehensive calibration check.*

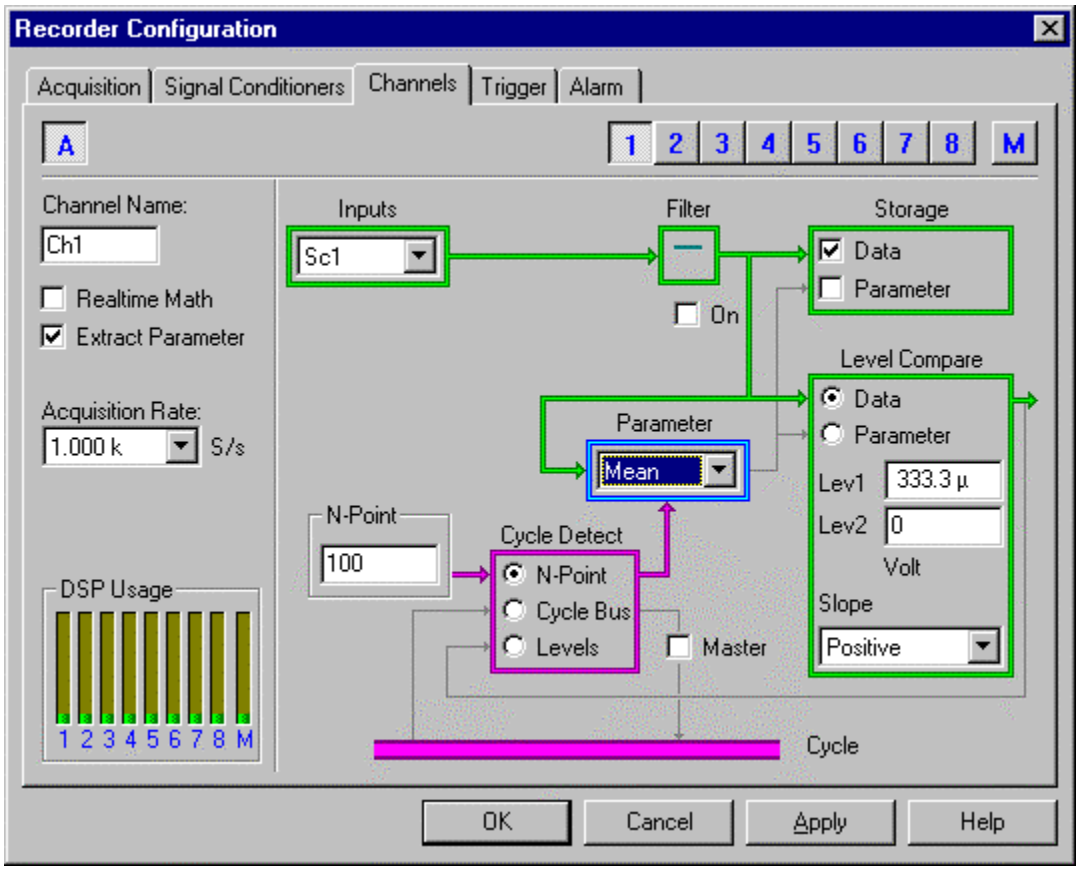


Step 4: Click on the next Configuration tab **Channels**. Click on each Channel number in turn (the buttons 1-8 at the top.) On each channel, make the settings:

a. Click the checkbox **Extract Parameters** to turn on measurement functions.

b. From the **Parameter** pull-down menu, select **Mean**.

This causes each channel to measure its input and display the average of 100 values *. When finished setting all channels, click **OK** to accept the settings and return to the Recorder display.

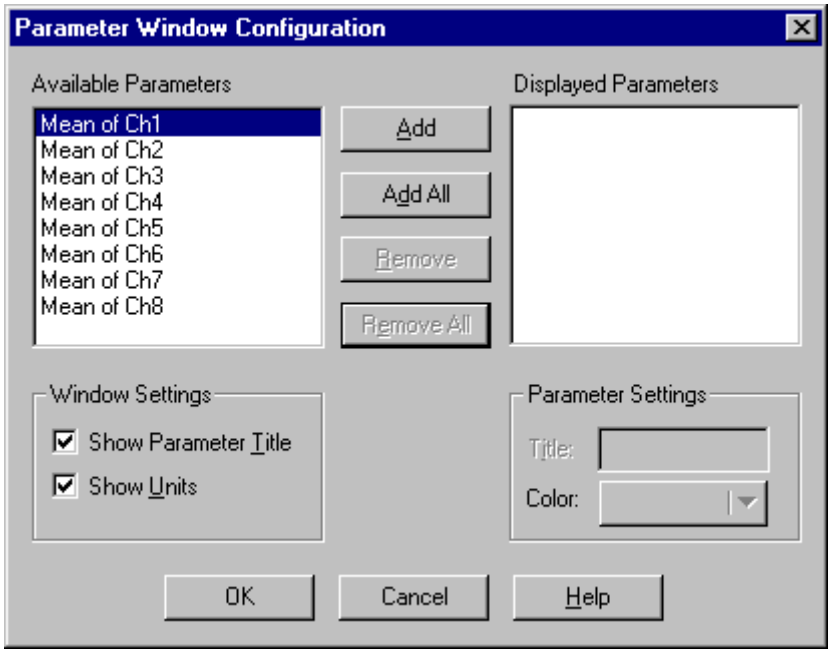


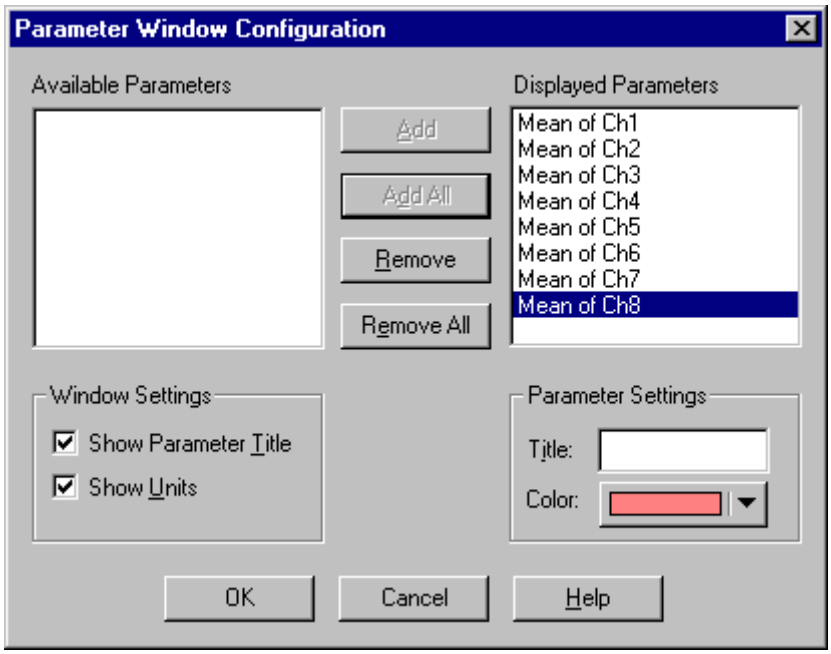
* **Note** on OD-200 acquisition card:

The OD-200 card does not feature real-time parameter measurements. If testing an OD-200 card, it is necessary to use the Odyssey's Calculator function to measure the mean value of each channel in turn. See the *Calculator* section in Chapter 10 if you are not familiar with the Calculator.

Step 5: From the **Config** menu selection of the main menu, select **Parameters**. The following dialog will appear. If the Mean measurements are not in the right box **Displayed Parameters**, click the button **Add All** to select them for display.

Click the **Show Units** checkbox to turn it off (no check mark). This allows more Parameters to be visible on the screen. When finished, Click **OK**.



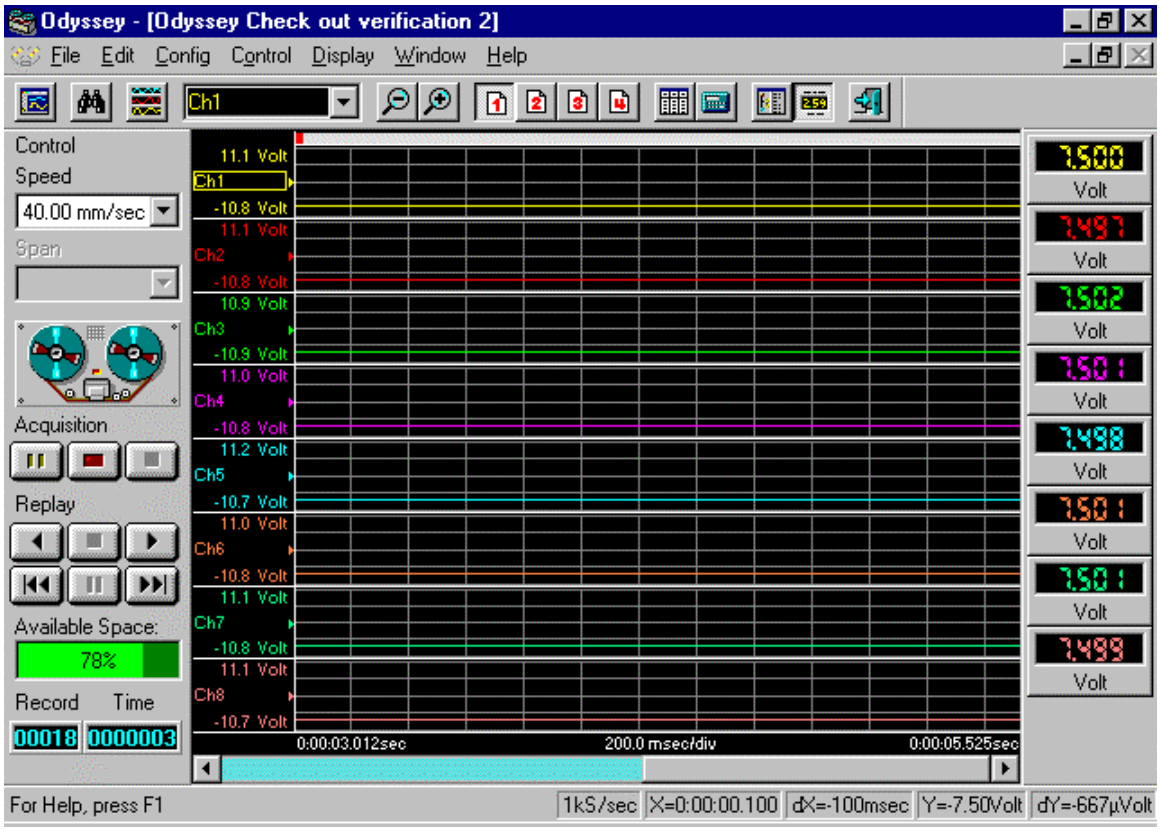


All Odyssey settings are now completed. We recommend you save the settings on the hard disk or a floppy disk for future use. Use the main menu **File…Save System Setup** to store the settings for each Span setting you will test.

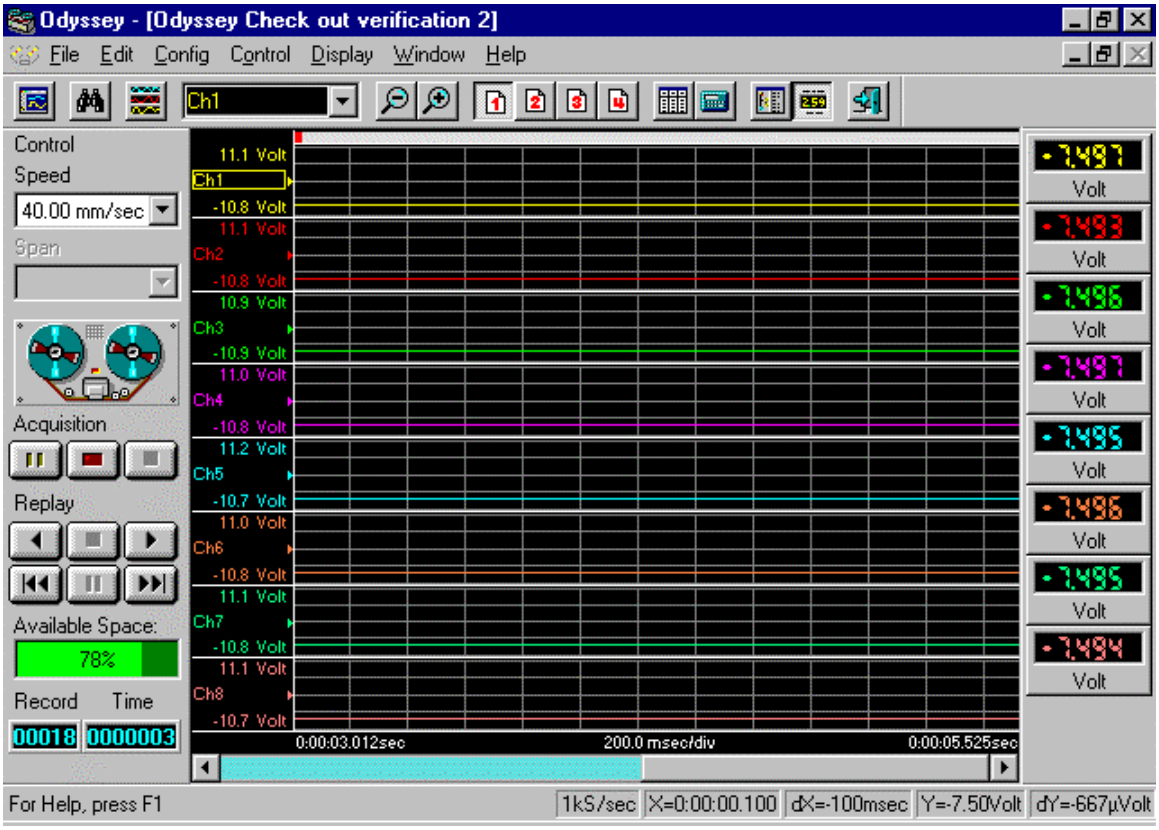
Step 6: Apply a DC voltage of 75% to 95% of positive full scale to all inputs simultaneously. For the 20V Span in this example (+/-10 V), apply +7.50 Volts.

Press the **Pause** button on the Odyssey front panel. Your display should look like this, with the Mean values updated a few times a second.

Observe and record the Mean voltage readings for each Channel. Some fluctuation in the last digit is normal: record the most frequent value that you see.



Step 7: Apply a negative voltage of the same value to all inputs simultaneously. For the 20V Span in this example (+/-10 V), apply -7.50 Volts. Observe and record the Mean voltage readings for each Channel. Some fluctuation in the last digit is normal: record the most frequent value that you see.



Step 8: For each channel, add the positive and negative readings to find the total voltage. In the 20 V Span, the total is approximately 15 Volts. For example, Channel 1 in the above displays measured +7.500 and –7.497 for a total of 14.997 Volts.

Subtract the expected standard value from the value of the reading. With 15V applied, Channel 1 read a total of 14.997V. The error is (14.997 – 15.000) = -0.003 Volt.

Error = (Positive Reading + Negative Reading) – Actual Input Voltage

Compare the amount of error to the specification limit. Refer to the Odyssey Specification Sheet, document 169-91310x for specifications for each amplifier. For the Basic Amplifier, the Maximum Static Error (MSE) is 0.05% of Full Scale Span. For a 20V Span, the maximum error within specification is therefore (20V * 0.0005) or 0.010 Volt. Channel 1 is well within specification.

Specification Limit = Span * (Maximum Static Error Percentage/100)

For each Channel, compare the calculated Error to confirm it is less than the Specification. If all channels are within specification, the test for this Span is completed. If any channel exceeds specification, a recalibration is required. Contact Nicolet for instructions on obtaining calibration services.

Step 9 (optional): If desired or if required by your standard procedures, additional voltage points, spans and amplifiers may be tested in similar fashion. For example, if the other Spans of a Basic Amplifier are to be tested, a table similar to the following would be constructed. Note that on the 2V Span, the Basic Amplifier MSE rating is 0.08% and the Specification Limit is therefore 0.0016 Volt. Refer to Odyssey Specification sheet P/N 169-91310x for specifications of all amplifiers.

Ch #	20V Span Input	20V Span Measure	20V Spec Limit	10V Span Input	10V Span Measure	10V Spec Limit	4V Span Input	4V Span Measure	4V Spec Limit	2V Span Input	2V Span Measure	2V Spec Limit
Ch 1	15.00	14.997	0.010	7.500		0.005	3.000		0.002	1.500		0.0016
Ch 2	15.00		0.010	7.500		0.005	3.000		0.002	1.500		0.0016
Ch 3	15.00		0.010	7.500		0.005	3.000		0.002	1.500		0.0016
Ch 4	15.00		0.010	7.500		0.005	3.000		0.002	1.500		0.0016
Ch 5	15.00		0.010	7.500		0.005	3.000		0.002	1.500		0.0016
Ch 6	15.00		0.010	7.500		0.005	3.000		0.002	1.500		0.0016
Ch 7	15.00		0.010	7.500		0.005	3.000		0.002	1.500		0.0016
Ch 8	15.00		0.010	7.500		0.005	3.000		0.002	1.500		0.0016

Odyssey Timebase Accuracy Verification

This section discusses the procedure used to verify the accuracy of the Odyssey's timebase. The specification listed in Appendix B of this manual is tested by measuring the frequency generated by the crystal oscillator package in the Odyssey. The procedure below simulates the factory procedures without disassembling the entire instrument.

Step 1: Set the sample rate of the Odyssey (all channels) to 100kS/sec. Set the voltage range to 10V FS for all amplifiers (except the Thermocouple module were this is not applicable).

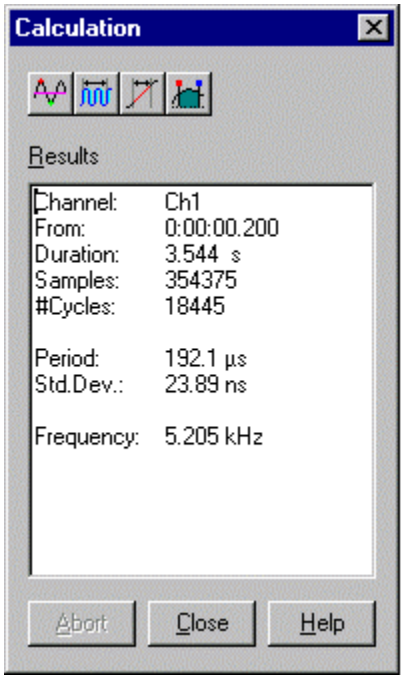
Step 2: Input a 5.2KHz, 5 Vp-p sine wave into the channel under test.

Step 3: Press the Start button, acquire data for approximately 5 seconds and then press the Stop button.

Step 4: Verify that the cursors are separated in such a manner as to include as many cycles as possible of the above inserted frequency.

Step 5: Verify that the channel under test is the channel referenced.

Step 6: Select the Calculator function (see Chapter 10: Using the Display Menu) and select the Frequency Tool. See figure below.



Step 7: Verify that the frequency measured is accurate according to the frequency input.

Odyssey Least Replaceable Units (LRU's)

This section lists the Least Replaceable Units (LRU's) that are available from Nicolet to support your service and repair activities.

Odyssey 32-Channel Mainframe LRU's

025-769100	SW/RO/DPST 212FHOC30AOS-25A
035-901700	BUTT/400 PANEL ROUND/DARK GRAY
035-901800	BUTT/400 PANEL OVAL
035-902200	BUTT/400 PANEL RND/LIGHT GRAY
035-903000	BUTT/PANEL ROUND 1201 GREEN
041-900000	SPKR/2.25" 8 0HM
045-901700	KNOB/PWRPRO LARGE
045-901800	KNOB/PRO ENCODER MEDIUM
068-933100	ESC/ODYS FRONT PANEL
070-707800	FUSE/4AMP 250V 3AG SLO-BLO
070-716500	FUSE/7AMP 250V 313 007
072-707300	FAN/24V DC 032142 ROTRON
072-900100	FAN/24V DC LOW PROFILE
085-769100	CBL/PWRPRO ASTEC +5V TO DIST BD
085-769200	CBL/PWRPRO PWR SPLY AC LINE
085-769500	CBL/PWRPRO ASTEC 6-COND
085-946800	CBL/ODYS SERIAL
085-946900	CBL/ODYS PRINTER
085-947000	CBL/FLOPPY DRIVE DATA
085-947100	CBL/IDE HARD DRIVE DATA
085-947200	CBL/ODYS FLAT PANEL
085-947200	CBL/ODYS FLAT PANEL
085-947300	CBL/ODYS TEKNOR
085-947500	CBL/ODYS TEKNOR PS/2 MOUSE
085-947600	CBL/ODYS FLOPPY POWER
085-947700	CBL/ODYS HARD DRIVE POWER
085-947801	CBL/ODYS AC POWER
085-948000	CBL/ODYS +5 DISTRIBUTION

Odyssey 32-Channel Mainframe LRU's (cont.)

085-948100	CBL/ODYS PWR DIST
085-948200	CBL/ODYS INTERNAL SCSI
085-950300	CBL/TRACK PAD FLEX STRIP
085-950900	CBL/ODYSSEY TFT INVERTER
085-952000	CBL/ODYS TEKNOR-BCPLN MOD
085-952601	CBL/ODYS SHIELDED FLAT PANEL
085-962001	CBL/ODYS 936 TEK PS2 MOUSE
113-723100	PWR SPLY/350W ASTEC W/FAN&EMI
113-901800	PWR SPLY/5/15/15/12/350W
113-903600	PWR SPLY/5/12/15/15/600W
114-712400	FLTR/EMI 10AMP FN1393-10-05-12
114-719900	FLTR/PWRPRO SCR INTAKE AIR 15PPM
114-901300	FILTER/POWER ENTRY DELTA 06CR3
117-901100	KIT/ODYS REMOTE CONNECTOR/PINS
159-900501	BAFFLE/ODYS AIR INTAKE
163-900000	DISPLAY/ODYS 640X480 TFT
164-901600	GRAT/ODYS FLAT PANEL DISPLAY
222-107900	DRIVE/3.5 IN. FLPY 720K/1.44BLK
222-914100	HARD DRIVE IDE 1GB IBM 94G3186
222-914200	MOUSE MICROSOFT SERIAL
222-914300	MEMORY 2MX32BIT 72 PIN EDO SIMM
222-914500	KEYBOARD AT IBM COMP USA
222-914900	WINDOWS 95 ENGLISH
222-915302	PENTIUM PCI-ISA SINGLE BD COMP
222-915500	PENTIUM CHIP P100
222-915600	MEMORY 2MX36 72PIN SIMM 70NS
222-915700	KEYBOARD PS/2 G83-6104 US
222-915800	KEYBOARD PS/2 G83-6104 FRENCH
222-915900	KEYBOARD PS/2 G83-6104 GERMAN

Odyssey 32-Channel Mainframe LRU's (cont.)

222-916000	KEYBOARD PS/2 G83-6104 UK
222-916200	HARD DRIVE IDE 2.5 GB WD325
222-916300	PENTIUM CHIP P133 W HS/FAN
222-918100	MEMORY 4MX32 72PIN SIMM 70NS
222-918200	MEMORY 8MEGX32 FPM 60NS
222-918800	HARD DRIVE 2GB IDE AC22000
222-919600	P PENTIUM CHIP 166 MHZ W/FAN
222-928700	HDD 30.7G IDE 3.5" WD 300AB
405-018800	CBL/400S GROUND
415-021400	POWER DIST BD PWRPRO(P=8)
415-022500	ODYSSEY BACKPLANE TESTED ASSY
415-023000	ODYSSEY FRONT PANEL BD TESTED ASSY
415-029400	SHARP LS460 TFT DISPLAY INVERTER
415-029500	ODYSSEY TOUCH PAD MODULE
415-030200	ODYS SHARP 933 LCD ADAPTER
415-030400	ODYSSEY DSP SIMM 32KX8
415-030700	ODYSSEY SIMULATOR BOARD
415-032700	ODYS TEKNOR MOD FAB ASSY
415-033700	ODYS SCSI 2 ADAPTER
445-010700	ODYSSEY COVER ASSY
445-010800	ODYSSEY FRONT PANEL ASSY
445-011300	ODYSSEY TEKNOR 933 ASSY
445-012800	ODYSSEY TFT ASSY
445-016800	ODYSSEY TEKNOR 936 ASSEMBLY
445-016900	ODYSSEY FRONT PANEL ASSY W/421 TFT
445-017000	ODYSSEY 421 TFT ASSEMBLY

Odyssey 16-Channel Ruggedized Mainframe LRU's

025-769100	SW/RO/DPST 212FHOC30AOS-25A
025-900000	SWITCH/ODYS POWER
033-902900	HOUSING/MINI ODYSSEY KEYBOARD
035-901700	BUTT/400 PANEL ROUND/DARK GRAY
035-901800	BUTT/400 PANEL OVAL
035-902200	BUTT/400 PANEL RND/LIGHT GRAY
045-901700	KNOB/PWRPRO LARGE
045-901800	KNOB/PRO ENCODER MEDIUM
048-900600	HINGE/KEYBOARD TRAY MINI ODYS
068-933100	ESC/ODYS FRONT PANEL
070-707800	FUSE/4AMP 250V 3AG SLO-BLO
070-716500	FUSE/7AMP 250V 313 007
072-707300	FAN/24V DC 032142 ROTRON
072-900100	FAN/24V DC LOW PROFILE
085-946900	CBL/ODYS PRINTER
085-947000	CBL/FLOPPY DRIVE DATA
085-947100	CBL/IDE HARD DRIVE DATA
085-947200	CBL/ODYS FLAT PANEL
085-947300	CBL/ODYS TEKNOR
085-947500	CBL/ODYS TEKNOR PS/2 MOUSE
085-947600	CBL/ODYS FLOPPY POWER
085-950300	CBL/TRACK PAD FLEX STRIP
085-950900	CBL/ODYSSEY TFT INVERTER
085-950900	CBL/ODYSSEY TFT INVERTER
085-952000	CBL/ODYS TEKNOR-BCPLN MOD
085-952601	CBL/ODYS SHIELDED FLAT PANEL
085-956300	CBL/MINI ODYS HD PWR
085-956400	CBL/MINI ODYS AC WIRING
085-9565E0	CBL/MINI ODYS T5 TO BCKPLNE
085-956600	CBL/MINI ODYS PWR DISTR
085-9567E0	CBL/MINI ODYS SCSI DRIVE
114-712400	FLTR/EMI 10AMP FN1393-10-05-12

Odyssey 16-Channel Ruggedized Mainframe LRU's (cont.)

114-719900	FLTR/PWRPRO SCR INTAKE AIR 15PPM
117-901100	KIT/ODYS REMOTE CONNECTOR/PINS
164-901600	GRAT/ODYS FLAT PANEL DISPLAY
222-107900	DRIVE/3.5 IN. FLPY 720K/1.44BLK
222-914300	MEMORY 2MX32BIT 72 PIN EDO SIMM
222-915302	PENTIUM PCI-ISA SINGLE BD COMP
222-915500	PENTIUM CHIP P100
222-915600	MEMORY 2MX36 72PIN SIMM 70NS
222-918100	MEMORY 4MX32 72PIN SIMM 70NS
222-918700	ADAPT/ODYS AT-PS2 KEYBD CONNECT
222-918800	HARD DRIVE 2GB IDE AC22000
222-919600	P PENTIUM CHIP 166 MHZ W/FAN
405-018800	CBL/400S GROUND
415-023000	ODYSSEY FRONT PANEL BD TESTED ASSY
415-029400	SHARP LS460 TFT DISPLAY INVERTER
415-029500	ODYSSEY TOUCH PAD MODULE
415-030200	ODYS SHARP 933 LCD ADAPTER
415-030700	ODYSSEY SIMULATOR BOARD
415-033700	ODYS SCSI 2 ADAPTER
445-010800	ODYSSEY FRONT PANEL ASSY
445-011300	ODYSSEY TEKNOR 933 ASSY
445-016800	ODYSSEY TEKNOR 936 ASSEMBLY
445-012800	ODYSSEY TFT ASSY

OD-100 Acquisition Card LRU's

085-948200	CBL/ODYS INTERNAL SCSI
085-956700	CBL/MINI ODYS SCSI DRIVE
222-912600	HARD DRIVE 1GBYTE SCSI 3.5
222-917200	HARD DRIVE SCSI 4GB ST34572N
222-920900	HARD DRIVE SCSI ST39216N
415-022400	ODYSSEY HYDRA TESTED ASSY
415-030400	ODYSSEY DSP SIMM 32KX8 TESTED

OD-200 Acquisition Card LRU's

085-959300	CBL/ODYS OD-200 HDD
085-943200	CBL/BE490- CA4
415-041800	ODYS OD-200 AMPLIFIER
085-959401	ODYS/OD-200 AMPLIFIER
415-052900	ODYSSEY 0D-200 8MW CPU
415-050500	ODYSSEY OD-200 2MW CPU
222-920700	HARD DRIVE SCSI 4.55GB ST34573W
222-920800	HARD DRIVE SCSI 9.1G ST39173LW
222-924600	HARD DRIVE SCSI 9.1B ST39175LW
222-929600	HARD DRIVE SCSI 18.4G ST318437LW
415-030400	ODYSSEY DSP SIMM 32KX8 TESTED

Basic Amplifier LRU's

044-919901	SHIELD/ODYS SCAMP COMP SIDE
085-760100	CBL/COAX 5 IN. BNC/HDR 50 OHM
085-952800	CBL/BNC GROUND LUG
085-957000	CBL/ODYS BNC TO CHABBIN 5" 3PIN
415-023100	ODYSSEY BASIC AMP BD ASSY

Bridge Amplifier LRU's

016-900000	CON/HYPERTRONICS DO-2 9 Pin (pkg of 10) mate for 024-913400
044-920000	SHIELD/ODYS BASIC AMP SOLDER SIDE
085-952901	CBL/ODYS STRAMP EXTERNAL
415-032500	ODYS STRAMP TESTED ASSY

Accelerometer Amplifier LRU's

044-920000	SHIELD/ODYS BASIC AMP SOLDER SIDE
044-9224E2	SHIELD/ODYS ICP AMP COMP SIDE
415-033900	ACCELEROMETER TESTED ASSY

Isolated Voltage Amplifier LRU's

024-913000	CON/SHROUDED BANANA JACK RED
024-913100	CON/SHROUDED BANANA JACK BLACK
032-903700	INSUL/ODYS ISO AMP SOLDER SIDE
044-921700	SHIELD/ODYS ISO AMP COMP SIDE
044-921800	SHIELD/ODYS ISO AMP SOLDER SIDE
044-923001	P SHIELD/ODYS ISO AMP INTERIOR
415-034000	ODYS ISOLATION AMP TESTED ASSY

Low Voltage Amplifier LRU's

024-913000	CON/SHROUDED BANANA JACK RED
024-913100	CON/SHROUDED BANANA JACK BLACK
032-9041E0	INSUL/ODYS LV ISO AMP SOLD SIDE
044-9237E1	SHIELD/ODYS LV ISO AMP COMP SID
415-039000	ODYS LOW VOLTAGE ISO AMP TESTED

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