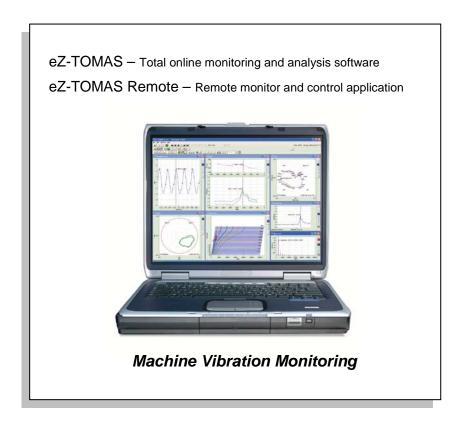
eZ-TOMAS version 8.0.x eZ-TOMAS Remote version 8.0.x

Requires a 32-bit version of Windows®



Windows 2000 SP4 Windows XP Windows Vista (x86)



IOtech

25971 Cannon Road Cleveland, OH 44146-1833

(440) 439-4091 Fax: (440) 439-4093 sales@iotech.com productsupport@iotech.com www.iotech.com



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In regard to data acquisition systems, the following terminology is used:

- ZonicBook refers to a ZonicBook/618E.
- WaveBook refers to WaveBooks in general, except when a specific model is specified.
- **IOtech 600 Series** refers to dynamic signal analyzers 640, 650, 652, 655, and 672.



Reference Note:

The information provided in this manual applies to the above noted analyzers with exceptions as noted. Refer to your system's specific hardware documentation in regard to hardware setup. PDF versions of documents are included on CD and on our website. They are also installed in the Programs group on your PC as a part of product support, during the software installation process.

What is eZ-TOMAS?

eZ-TOMAS (Total Online Monitoring and Analysis Software) is designed to acquire, limit check, store, and analyze vibration and process data from rotating machinery. eZ-TOMAS can be used with ZonicBook, WaveBook, and IOtech 600 Series hardware. The application can be used as a server for scenarios involving remote control. Remote viewing is possible via *eZ-TOMAS Remote*.

Analog input signals are typically associated with a specific machine train; and can be any combination of the following:

- Proximity
- Velocity
- Accelerometer
- Tachometer
- · DC proportional voltage
- Microphone
- Pressure

Note: The *eZ-TOMAS Remote* application, purchased separately, allows you to remotely monitor and/or control eZ-TOMAS applications through client/server architecture. If needed, refer to Chapter 10 for additional information.

Installing and Starting the Application

System Requirements

Verify that you have a 32-bit version of Windows, the following items, and meet or exceed the minimum requirements listed.

- For Ethernet devices: 10/100BaseT Ethernet port [on PC or on a hub connected to the Ethernet]
- For USB devices: a USB port on the host PC [USB2.0 recommended]
- Monitor: SVGA, 1024 x 768 screen resolution
- Windows 2000 SP4 and Windows XP users:

PC with Intel[™] Pentium 4 or equivalent

1 GB memory; 10 GB disk space

Windows Vista (x86) users:

PC must be Windows Vista Premium Ready

- Dynamic Signal Analysis (DSA) CD
- License Keys for eZ-TOMAS and/or eZ-TOMAS Remote, as applicable
- For eZ-TOMAS users wanting to acquire data: Data acquisition hardware and associated cables and power supplies. Compatible hardware includes ZonicBook/618E, WaveBooks, and IOtech 600 Series.
- User documentation: available in pdf format on CD and on-line at: www.iotech.com



If using eZ-TOMAS Remote, the version numbers of eZ-TOMAS Remote and eZ-TOMAS must match.



If using eZ-TOMAS Remote, be aware that an effective firewall will likely alert the eZ-TOMAS host application when eZ-TOMAS Remote is trying to monitor information or take control; and will block such remote attempts. We recommend that you maintain firewall protection; however, you will need to set your firewall to allow access to eZ-TOMAS Remote. As used here, providing firewall access means making ports used by clients and servers open [on both ends].

Software Installation

- 1. Start Windows.
- 2. Close all running applications.
- 3. Insert the Dynamic Signal Analysis CD into your CD-ROM drive and wait for the CD to auto-run.

If the CD does not start on its own:

- (a) click the desktop's <Start> button
- (b) choose the Run command
- (c) select the CD-ROM drive, then select the **setup.exe** file.
- (d) click <OK>.

An *Opening Screen* will appear.

- 4 Click the **ENTER SETUP**> button
- From the hardware selection screen [which follows a licensing agreement], select the type of data acquisition device you are using from the drop-down list.
- On the Software Options Dialog screen, select eZ-TOMAS Machine Vibration Analysis.



In addition, if you want to install **OPC Support**, check the **eZ-TOMAS OPC Support** checkbox. Note that the eZ-TOMAS Machine Vibration Analysis checkbox must be checked first.

7. Continue to follow the on-screen instructions.

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Requires a 32-bit version of Windows®

Windows XP

Windows 2000 SP4

Windows Vista (x86)



Reference Notes:

Adobe Acrobat PDF versions of **documents pertaining to hardware and** software are automatically installed onto your PC's hard-drive as a part of product support at the time of software installation. The default location is the **Programs** group, which can be accessed via the *Windows Desktop Start Menu*.

Running eZ-TOMAS

To run eZ-TOMAS, double-click the associated icon or use your Windows desktop Start button to navigate to the program. This is located in the programs group by default.

The first time you start the application you will be prompted for your name, your company name, and a license number. The number will activate eZ-TOMAS for every day operations. Note that the eZ-TOMAS license number does not apply to eZ-TOMAS Remote, and will not activate it [Chapter 10 discusses eZ-TOMAS Remote].

If you are loading your software from a CD, the license key will be available on the *Authorization Code Sheet* that accompanied the CD, as part of your order. If you downloaded your software from the website, your license key (authorization code) will be e-mailed to you within one business day.

You will be prompted to set up your project's security password. When you click the <Save> button the *Password Confirm* window opens. Retype your security password and click the <Confirm> button.

The program's Main window appears after your license key is accepted.

Connecting Signals

WaveBook and ZonicBook Users

Connect the analog signals to the analog input BNC connectors. WaveBooks, ZonicBooks and the WBK14 and WBK18 dynamic modules require no physical hardware configuration. Configuration is accomplished via software.



Reference Note:

Information regarding the following products is provided in documentation as follows:

- WaveBook WaveBook User's Manual (p/n 489-0901).
- Described Programme Tonic Book/618E Zonic Book/618E User's Manual (p/n 1106-0901).

PDF versions of the documents are included on CD, website, and are installed in the Programs group on your PC during software installation as a part of product support.

IOtech 600 Series Users

Connect the analog signals to the analog input BNC connectors. These dynamic signal analyzers require no physical hardware configuration. Configuration is accomplished via software.

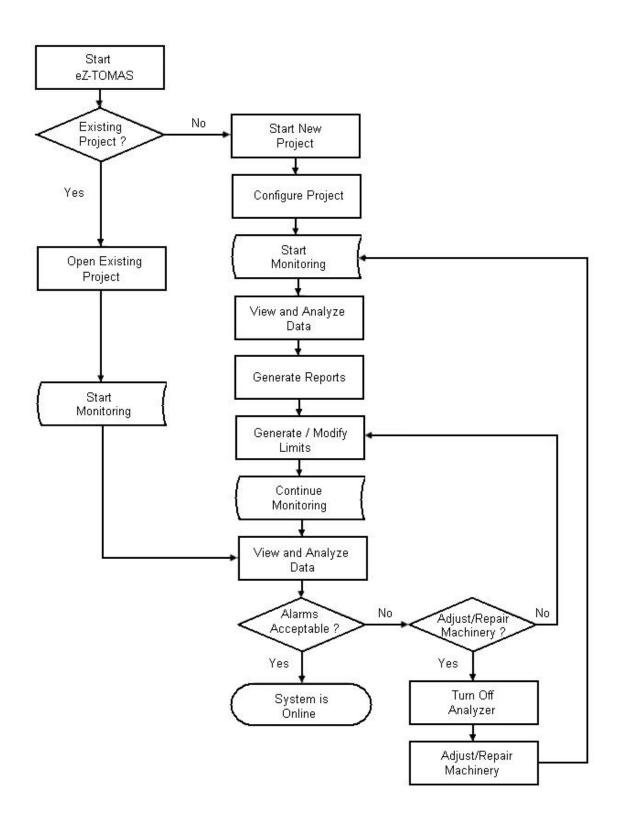


Reference Note:

Information regarding 600 Series products is provided in Quick Starts and Users Manuals.

PDF versions of the documents are included on the installation DSA CD, website, and are installed in the Programs group on your PC during software installation as a part of product support.

eZ-TOMAS Order of Operation

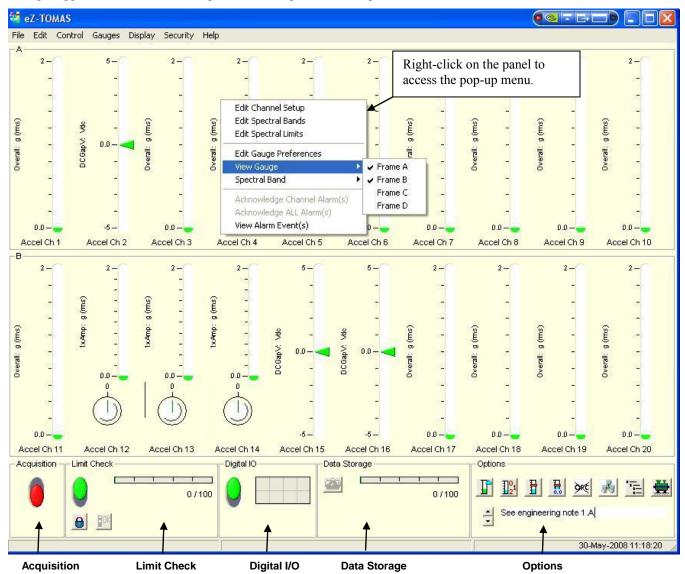


A Look at the Gauge Window & Control Pull-down Menu

The Gauge Display Window is used to show real-time values and measurement status. Gauge Display is not used for historical data analysis. The Gauge Window in *eZ-TOMAS Remote* looks identical, except a Server panel is included on the left edge of the window (see the network section of Chapter 3 for an illustration).

The main window of the GUI (graphical user interface) includes a set of virtual gauges, which use one of 14 spectral bands, discussed shortly. There will always be a vertical gauge associated with each input channel. When the 1x Amp/Phase selection is made, spectral bands for "1x Amplitude" and "1x Phase" are simultaneously displayed, with the later being in a circular phase gauge (see second figure).

In addition to spectral band gauge displays, eZ-TOMAS can interactively display data in a variety of other formats, including: Orbit, Polar, Time, Bode, Cascade/Waterfall, Strip Chart, and Shaft Centerline. You can control the acquisition through toggle switches on the lower panels or through the Control pull-down menu.



Gauge Window Display - Various Spectral Bands

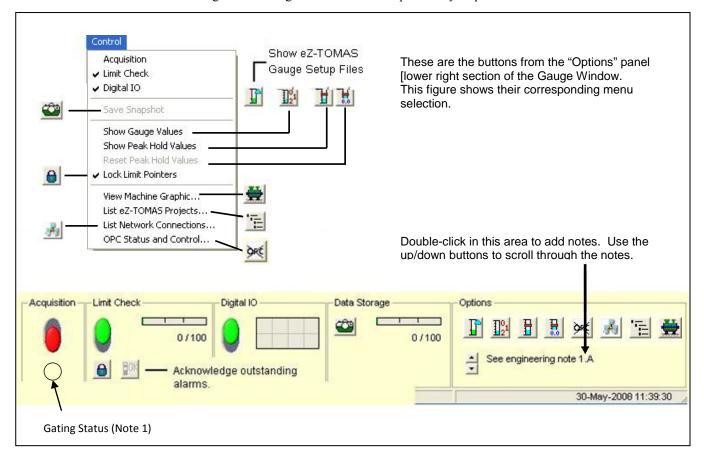


Tip: You can use the mouse to accomplish the following.

- O Double-click the left-mouse button on an area of the gauge window to access a plot display window.
- When limit pointers are used for a vertical gauge you can use the mouse to drag them to new positions, thus setting new limit values.
- When applicable, you can drag limit-lines on circular phase gauges to new positions, thus setting new values for the phase angle limits.
- o Right-click on an area of the gauge window to bring up a menu with several edit options (see frame A in figure).

The data acquired by eZ-TOMAS and the supporting configuration information are stored in user-defined files. This allows a single eZ-TOMAS system to be used with several different machines. The acquired data is stored according to user-defined event changes, e.g., alarms, time, overall, and rotating speed.

Acquisition, instrumentation, and storage configuration parameters are also definable. These parameters are stored over time. Configuration changes do not invalidate previously acquired data.



Control Pull-Down Menu's Relation to Lower Panels

Acquisition

The Acquisition Panel contains one slide switch, which determines the ON/OFF status of data acquisition. Turn the data acquisition ON (Up/Green), or OFF (Down/Red).

Note 1: If gating is enabled, a yellow or green indicator will appear beneath the Acquisition switch during an acquisition. Yellow indicates that gating is enabled, but that gating conditions are not satisfied; green indicates that gating is enabled and conditions are satisfied. For details regarding gating refer to the *Storage Panel* section in chapter 3.

Limit Check Panel

The Limit Check panel contains a slide switch, an alarm log progress bar, a padlock button, and an <OK> button. The Limit Check slide switch determines the ON/OFF status of the Limit Checking feature [ON is Up/Green; or OFF is Down/Red.

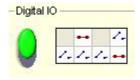
The Alarm Log Progress Bar graphically indicates how full the Alarm File is. The log can be accessed from the Display pull-down menu. The most recent alarm event will appear below the bar.

When there is an alarm event, channel labels will flash until the event is acknowledged. Click on the <OK> button to acknowledge all outstanding alarm events. You can right-click on a channel gauge to acknowledge alarm events for an individual channel. To list alarm events for a given channel, right-click on the channel's gauge, then select the View Alarm Event(s) menu option.

The padlock button is used to lock or unlock limit pointers.

Digital I/O Panel

The Digital I/O Panel contains an ON/OFF slide switch and a Relay Output Status display, which consists of 8 switches.



If the Digital IO slide switch is turned on, Digital I/O relay switches will activate [or deactivate] depending on the configuration set in the *Digital I/O Configuration* window (detailed in Chapter 3). The window is accessible via the **Edit** pull-menu.

During an acquisition you can manually activate each switch by clicking on the associated button.

Data Storage Panel

The Data Storage Panel is easily recognized by its Snapshot [camera] button and the bar for Current Data Record / History File Size. Data storage uses the *First In First Out* (FIFO) method of receiving and releasing data.

The bar graphically indicates how full the file is. Two numbers, separated by a slash, reside just below the progress bar. In the example this is 279 / 500. The first number is the current data record number (279 new records); the second number is the entire number of records stored in the FIFO file 500. The number of new records is referred to as the History File Size. In this case the History File Size is 279.

Clicking the **<Snapshot>** (camera) button will save "N" seconds of data to the history file; where "N" is defined in the *User Snapshot* field of the Storage Tab [in the Configuration Panel] The Configuration Panel is accessed through the Edit pull-down menu. The Gauge Window's data storage panel includes the data file's Date/Time Range.



FIFO Records Capacity Bar

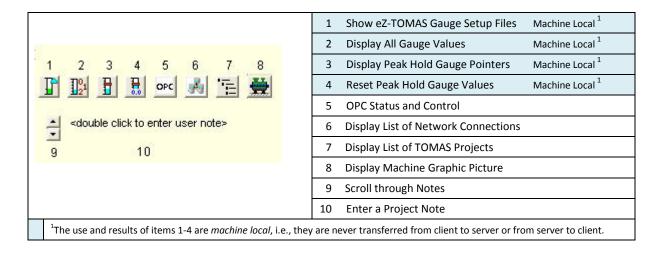
Number of Records that can be stored (History File Size)

Number of New Records

Date/Time Range of Data File

Options Panel

The Options Panel includes several items. A description of each follows.



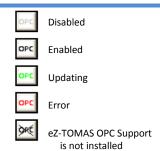
Item (1), "Show eZ-TOMAS Gauge Setup Files" Use this button to show (or hide if already visible) a list of gauge setup files. These files have '.tgs' extensions and are created when you select "Save Gauge Setup" from the Gauges pull-down menu. If no gauge setup files were saved a pop-up message will inform you.

Item (2), "Display All Gauge Values" Click this button to show (or hide if already visible) the values for each gauge. The values list beneath the associated gauges on the main window.

Item (3), "Display Peak Hold Gauge Pointers" Click this button to display (or hide if already visible) peak hold gauge pointers for each gauge. Each pointer shows the peak value reached for its respective gauge.

Item (4), "Reset Peak Hold Gauge Values" Click this button to reset the peak hold gauge values.

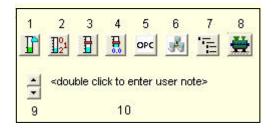
Item (5), "OPC Status and Control." This button image changes to indicate the OPC status. C licking on the button brings up an OPC Status and Control dialog which g ives more detailed in formation. F rome Z-TOMAS the OPC Status and Control dialog box allows you to enable/disable the OPC server update d uring a cquisition. Note that if server update is disabled during acquisition, then gauge values, as published, will be set to zero. See chapter 10 for information regarding OPC Support for eZ-TOMAS.



Item (6), "Display List of Network Connections" relates to eZ-TOMAS Remote which is discussed in Chapter 11. If you are using eZ-TOMAS Remote you can click on the button to display a list of all clients connected to the eZ-TOMAS server. A few notes: (a) The button will be dimif no network connections are enabled. (b) The Remote Network Connections dialog does not automatically update. To update the dialog box you must close, then reopen it. (c) If there is a client in controller mode, it will be denoted by two asterisks preceding the Remote PC ID, as shown in the second line of the example screenshot.



Remote Network Connections



Item (7), "Display List of TOMAS Projects," brings up a window that lists the available .tom project data files that can be displayed in eZ-TOMAS. The projects listed are those which are located in the folder for the current project, as well as the two folders adjacent to it. To locate other projects you can use the File pull-down menu, select "Open" and then use the "Look in" feature to locate available projects. The TOMAS Projects window displays the following for each project: File, Folder, Size, and Date Modified. To open a project in the list, double-click on it.

Item (8), "Display Machine Graphic Picture," brings up a selected .jpg or .bmp image to represent the associated machine or process being tested. The Machine Name is defined in the Project Information Window (see Edit Menu).

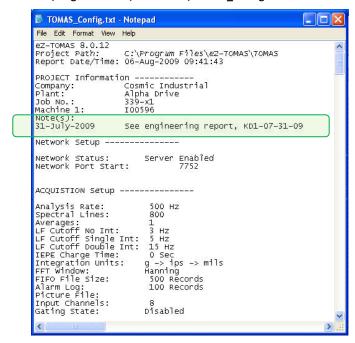
In regard to the graphic image, if you right-click in the window, two choices will appear: "Load graphic picture" and "Remove Graphic Picture." Clicking on the former allow you to browse your PC for the appropriate graphic. Note that this can also be accomplished through the Edit pull-down menu.

Item (9), "Scroll through Notes" Use the up/down arrow buttons to scroll through notes. See item 10.

Item (10) "Enter a Project Note." Double-click in the indicated area (see graphic above) to enter a note. The note text, preceded by date, appears in two places.

- 1. The **Project Information** dialog box. This can be accessed by selecting it from the **Edit** pull-down menu. For details on the dialog box refer to the *Project Information* topic on page 3-1.
- 2. **TOMAS_Config.txt Notepad**. This is a text file that includes data from the Project Information dialog, and elsewhere (See following figure). To access the **TOMAS_Config.txt** file, navigate to your eZ-TOMAS files which are typically saved at your default install directory; for example:

C:\Programs Files\eZ-TOMAS\TOMAS Config.txt

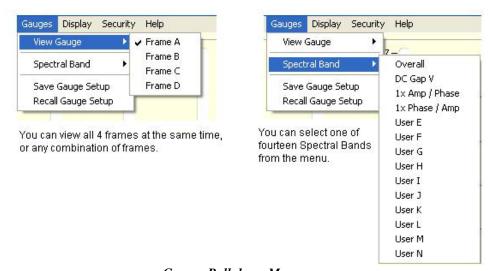


Locating a Note in the TOMAS_Config.txt File

A Look at the Gauges Pull-down Menu

Most of the Gauge window is occupied by gauges which display values for spectral bands and tachometers. Selection of the band types can be made from the "Gauges" pull-down menu.

The window supports up to four frames (A, B, C, D). Each frame can accommodate up to ten gauges.



Gauges Pull-down Menu

You can define the parameters of User Defined bands E through N in the Spectral Bands window as follows:

- 1. Open the Edit pull-down menu.
- 2. Select Spectral Bands.
- 3. Set the parameters of the User Defined bands (E through N) as desired.

Additional information of primary importance to the gauge window is included in Chapter 3, which concerns the window's Edit menu.

Note: For the IOtech 655, gauges can also be set to monitor temperature. *Gauge Display Preferences* in Chapter 3 provides additional information.

```
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Open Project ..... 2-2
Save As ..... 2-3
Erase History Data ..... 2-7
Erase Alarm Log ..... 2-7
```

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Starting an Acquisition 2-9
Viewing Spectral Bands 2-10

Plotting Data 2-12

Multiple Plots 2-12

"Real Time" Plot Controls 2-13
"History Data" Plot Controls 2-14

Using the File Pull-down Menu 2-1 New (Clone) Project 2-1

Viewing Reports 2-15

Print 2-7 Exit 2-7

An eZ-TOMAS Project is a collection of data files, typically associated with a monitored machine. The data files include configuration and measured data. When eZ-TOMAS is activated it attempts to open the last eZ-TOMAS Project accessed.



Multiple files are associated with each eZ-TOMAS project. Renaming a project file alone (*.tom) using Windows Explorer [or from within a directory dialog] will corrupt the project structure. The preferred way to rename a project is to use the File Menu 'Save As' entry.

In addition to the preceding note of importance, you should be aware of the following:

- If you are monitoring a machine for the first time, you should create a new eZ-TOMAS Project to store the machine's configuration and vibration data.
- If you have already created an eZ-TOMAS Project for the machine, use the File pull-down menu and select
 Open to pick up where you left off.
- The configuration and data files have a FIFO design. When you turn on the acquisition switch, data will be
 appended to the data files.
- Projects which have been automatically backed up become read-only projects. When a project is read-only, automatic startup of acquisition for that project is disabled, even if it is specified in its configuration.
 This is to avoid attempts to write to read-only files.

Using the File Pull-down Menu [In Gauge Window]

Open Project

Though this function is listed third on the menu list, we will mention it first here as it is frequently used and requires very little explanation. The **Open Project** option provides a means of locating and opening an existing eZ-TOMAS project.

Note: When eZ-TOMAS is started, it opens the last active project.

New (Clone) Project – Creates a Copy of a Project and its Data

Cloning a project keeps all of the values from the original project.

The **New (Clone) Project** option opens the *Save As* window. The first step in creating a new project is to select or create a Folder where the new project's files should be saved. Enter a filename for the project, then click the **Save** button.

Each eZ-TOMAS Project contains eZ-TOMAS **configuration** and **data** files. You should logically equate an eZ-TOMAS Project with a specific machine. This is accomplished as follows:



1. On the File pull-down menu, select New (Clone) Project. This opens the Save As window.

Save As Window, Being Used to Create a New File

- 2. Select [or create] a Windows folder for the eZ-TOMAS Project.
- 3. Enter the desired filename for this project.
- 4. Click the **Save** button to create the new project.

Initialize Project - Creates a New Project and Sets the Number of Available Channel Inputs

When a project is initialized you are essentially starting with a "clean slate." No data is carried over as when a project is cloned.

To inform eZ-TOMAS as to what type of hardware will be used, select "Initialize Project" from the Gauge Window's File pull-down menu. The resulting window allows you to select a Hardware Device and the applicable number of input channels.

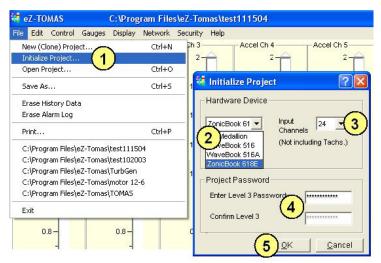


If you have multiple hardware modules, and change the number of Input Channels, you need to use the *initialize* function to create a new eZ-TOMAS Project. This needs to be done once, for the first implementation of the new hardware setup. An explanation of how to access and use the *Initialize Project* function follows.

When a project is initialized you are essentially starting with a "clean slate." No data is carried over, as would be when a project is cloned.

"Initialize Project" is accessed from the File pull-down menu. Initialize Project provides a means of selecting the hardware device and setting the number of input channels. For example: If you had an 8 channel Medallion and were going to change your acquisition to 24 channels, for example, using a ZonicBook/618E and two WBK18 modules, you would need to use the *Initialize Project* feature.

Complete the following steps to initialize a project. Note that the step numbers correspond to the numbers in the figure.



- 1. From the File pull-down menu, open "Initialize Project." An Initialize Project dialog will open.
- 2. Select the Hardware Device (e.g. 640u, ZonicBook/618E) from the associated pull-down list.
- 3. Select the number of analog input channels from the associated pull-down list. For ZonicBook/618E do not count the separate tach channels as input channels.
- 4. If applicable, enter and confirm the project password.
- 5. Click the <OK> button.

Note that the last section of the preceding chapter illustrates an example for 24 channels.



Depending on the data acquisition hardware, eZ-TOMAS will automatically enable gauges for the first 8 or 10 channels. If your device has more channels that you want to display you will need to enable them manually using the *Gauge Display Preferences* window (accessed via the *Edit* pull-down menu). From the *Gauge Display Preferences* window, ensure there is a checkmark in the "Visible" column for each channel that you want to display. Remove the checkmark for those you don't want to display. The window is discussed on page 3-21.

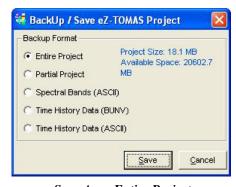
Save As

The **Save As** option allows you to backup history files in a binary file format, or export files in an ASCII file format. This command opens the **Backup/Save eZ-TOMAS Project** window. The options in this window change as you make selections. You can backup and export full or partial files.

Note: The disk space required to backup the selected records is displayed on the left panel.

Entire Project

The **Entire Project** option is only available when data acquisition is turned off. Entire Project performs a file copy operation to the specified Windows Directory. This backup method is the fastest.



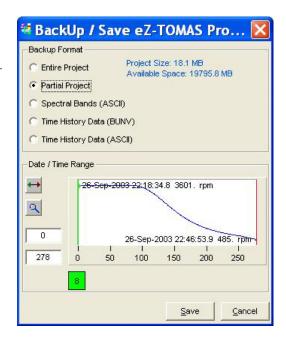
Save As... Entire Project

Partial Project

The **Partial Project** option can be used when data acquisition is active. This option copies data and the configuration setup to the designated folder for the date and time range specified in the panel on the right.

To make a partial backup:

- 1. Select the range you want to backup [see next section, Selecting Range Limits].
- Click the <Save> button. The Save As window will open.
- 3. Select the folder where the file is to be saved.
- Enter a filename.
- 5. Click the **Save** button.

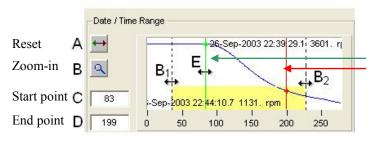


Save As... Partial Project

Selecting Range Limits

For each backup format, with exception of "Entire Project," you will need to select the start and stop points to define the range of data. This section explains how to use the Date/Time panel to set the range.

o **Button <A>** [in the following figure] resizes to the default history range.

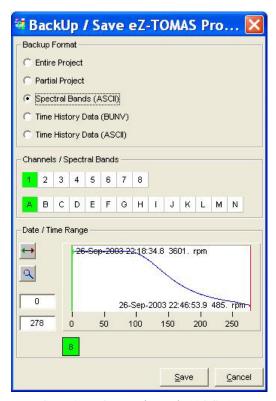


Drag Method "E" Place mouse cursor over a band, then hold left mouse button down to drag the limit band to a new location.

- o Button zooms in on the history range. This affects the view, not the range. After clicking on the button, put the mouse cursor at a point on the screen where you want the viewing area to begin (such as B₁ in the figure) and drag the mouse to the desired zoom end-point (for example, B₂). We have used a yellow band to show what would be in the new viewing area. Note that clicking button <A> would now reset the range.
- Numeric fields "C" and "D" allow you to enter range start and stop points. In the example these are 83 and 199. Note that the displayed Date/Time/RPM information changes to reflect the associated range end-point as you move the green or red limit band.
- o "Drag Method E" You can place the mouse cursor over the green (start) and red (end) limit bands, and then use the mouse to drag the selected band to a new range point.
- o Click the **Save** button once you have selected the desired range.

Backup Format - Spectral Bands (ASCII)

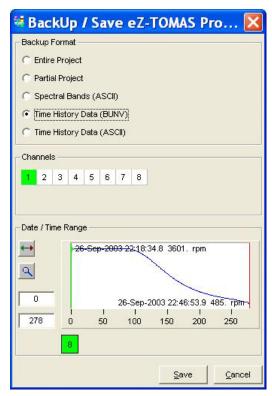
This option creates an exportable ASCII file for the spectral band data that resides within the specified Date/Time range.



Save As... Spectral Bands (ASCII)

Backup Format – Time History Data (BUNV)

This option creates an exportable Binary Universal (UFF-58B) format (BUNV) file for the Time History data that resides within the specified Date/Time range.



Save As... Time History Data (BUNV)

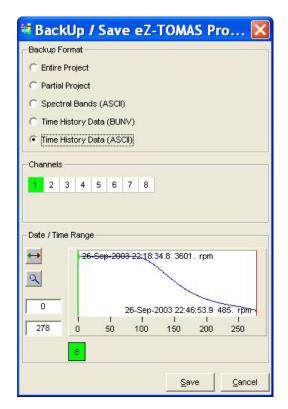
BackUp Format - Time History Data (ASCII)

You can save time history data in ASCII format. Select the: *File-Save As* menu option, then Click on the Time History Data (ASCII) menu option.

NOTE:

This option can result in relatively large files.

919490



Save As... Time History Data (ASCII)

EZ-TOMAS 5.5.09

ASCII Time Waveform Data Report generated 30-Aug-2006 11:15:01

Project Path: J:\Tomas Software\Data\Unit #2 Pre Outage\Ops Duwn 92603

Start Date: 26-Sep-2003 22:39:13
End Date: 26-Sep-2003 22:43:00

Sampling Rate: 1280. samples/second
Delta Time: 0.00078125 seconds

1. Brg 1Y mils 2. Brg 1X mils

4. Brg 2 "X" mils

Date / Time mSec Sample Time Wavefo				veform Data	
26-Sep-2003		190	1		-1.014 1.362
26-Sep-2003		190	2		-1.136 1.266
26-Sep-2003		190	3	1.131	
26-Sep-2003		190	4	1.456	-1.136 1.793
26-Sep-2003	22:39:13	190	5	1.702	-0.9803 1.991
26-Sep-2003	22:39:13	190	6	1.773	-0.8245 1.996
26-Sep-2003	22:39:13	190	7	1.729	-0.6158 1.920
26-Sep-2003	22:39:13	190	8	1.580	-0.3180 1.988
26-Sep-2003	22:39:13	190	9	1.288	-0.1010 1.878
26-Sep-2003	22:39:13	190	10	0.8858	0.1411 1.709
Etc					

Erase History Data



Use the Erase History Data option with caution. This menu item will erase History Data for the project. All data for the active project will be permanently removed. It is not recoverable.



Warning for Erase History

Erase Alarm Log



Use the Erase Alarm Log option with caution. This menu item will erase the Alarm Log file for the project. It is not recoverable.



Warning for Erase Alarm Log

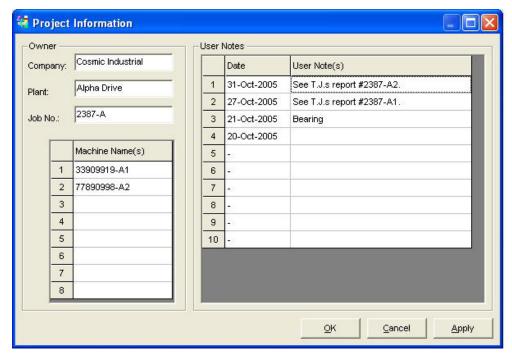
Print "Print" brings up the Print Window for printing the current screen.

Exit Closes the eZ-TOMAS application.

Configuring the Project

A default configuration is automatically loaded when you open an eZ-TOMAS file. However, you may want to make some changes to the configuration. To make changes:

- 1. From the eZ-TOMAS Main Window, open the Edit pull-down menu.
- 2. Select **Project Information** to open the associated window (following figure). Update information and/or add notes as applicable.



Project Information Window

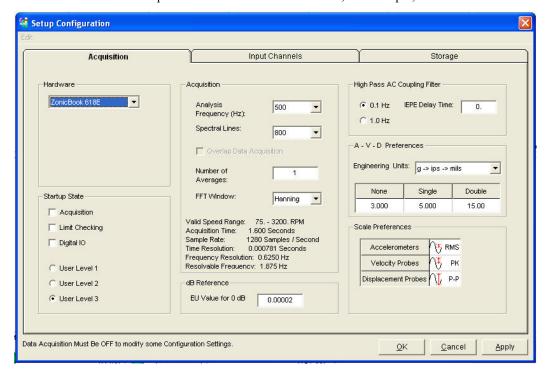
- 3. After the Project Information is as desired, click the **<OK>** button.
- 4. In the Edit menu select **Configuration**. The **Setup Configuration** window will appear (following figure).



Reference Note:

The four tabs of the Setup Configuration window are labeled: *Acquisition, Input Channels, Spectral Bands*, and *Storage*. They are discussed briefly in this section and in detail at the beginning of *Chapter 4*, *Edit Menu*.

5. Make sure that the Hardware panel reflects the correct hardware, for example, ZonicBook/618E.



Setup Configuration Window, Acquisition Tab



Clicking the <Cancel> button will undo all the changes you've made since you opened the Setup Configuration Window.

6. Make the desired changes for each of the tabs and then click the **Save** button.

You can start monitoring immediately.

Acquisition Tab – From the Acquisition tab you can set up parameters that include, but are not limited to: Block Size, Analysis Frequency, Low Cutoff Frequency, FFT Window, and Number of Averages.

Input Channels Tab – From the Input Channels Tab you can change channel parameters. This includes, but is not limited to assigning channel types, customizing channel names, setting the instrument range per channel, and assigning units.

Storage Tab - From the Storage Tab you can specify how you want trigger data storage. If any one event is triggered, data from all channels is stored. Data storage events are triggered when a change occurs in the monitored machine's condition. The basic idea is to activate storage based on **Time Change** *and/or* **Speed Change** *and/or* **Amplitude Change**.

Refer to Chapter 3 for more information regarding the Setup Configuration tabs.

Starting an Acquisition

After you configure your eZ-TOMAS Project, click the <**Acquisition> Switch** to place it in the ON (green) position. This starts the data acquisition. The switch is located in the in the lower left corner of the eZ-TOMAS gauge window.

When acquisition is active, real time overall values are displayed in the instrument gauges.

To stop data acquisition, click the switch. It appears in the slide-down position for OFF (red).

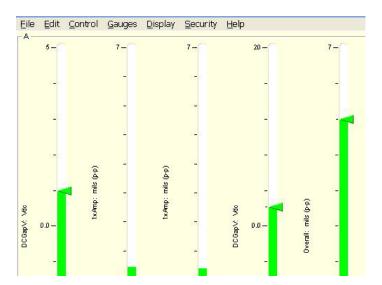
Viewing Spectral Bands

You can set spectral band options from the Main Gauge Window. There are several methods of setting gauges; these are discussed below.

In the partial gauge window at the right, we see five gauges with spectral bands selected as follows, from left to right.

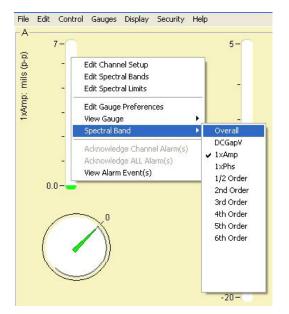
DCGapV. Vdc
 1xAmp: mils (p-p)
 1xAmp: mils (p-p)
 DCGapV: Vdc
 Overall: mils (p-p)

We can change the spectral band for each gauge, independently; or we can make a global change – where we would apply the same spectral band to all gauges at once.



To set a gauge independent of other gauge settings:

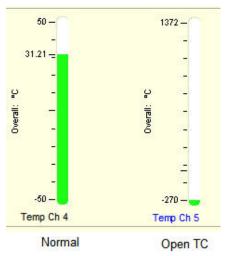
- 1. Right-click in the applicable gauge.
- Select "Spectral Band."
- 3. Select the desired band type. (See second figure)

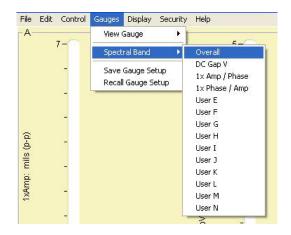


Open TCs and Open IEPE

Open temperature and open IEPE channels are indicated by a blue gauge label. In the figure to the immediate right we see that "Temp Ch 4" has a black gauge label which is indicative of a normal (closed) connection. "Temp Ch 5," however, has a blue gauge label, which indicates that the associated thermocouple is *open*.

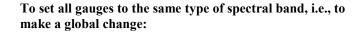
Note that the example at the right is from an IOtech 655u which includes five temperature channels.











- 1. Open the **Gauges** pull-down menu.
- 2. Select the band of interest.

As soon as step 2 is performed, all gauges will change to the selected spectral band.

Note: Selecting 1x Amp/Phase or 1x Phase/Amp results in two gauge types. In both of these instances, a vertical gauge will display for 1x Amplitude and a circular phase gauge will display for 1x Phase.

To set all gauges to a previously established set of gauge settings:

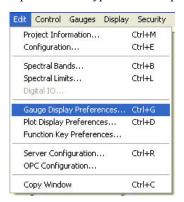
You must first have one or more saved gauge setup files. When you have a setup that you believe you will use frequently, open the Gauges pull-down menu and select "Save Gauge Setup." In the "Save As" window that appears, select a Filename and a location. Then save the .tgs file.

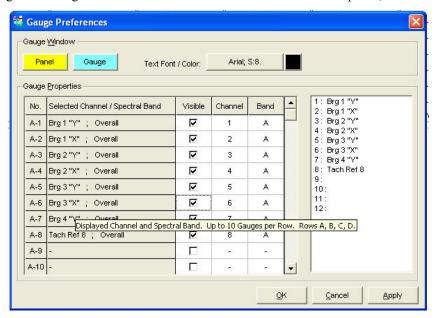
You can either:

- (a) use the Gauges pull-down menu and select "Recall Gauge Setup" or
- (b) click on the <Show eZ-TOMAS Gauge Setup Files> button.

You can also affect the Gauge Window from the Edit pull-down menu.

Selecting "Gauge Preferences" opens an associated window. See following figure. From there you can drag a desired spectral band type over to a specific gauge. The Gauge Preferences window is discussed in detail in Chapter 3, Edit-menu.

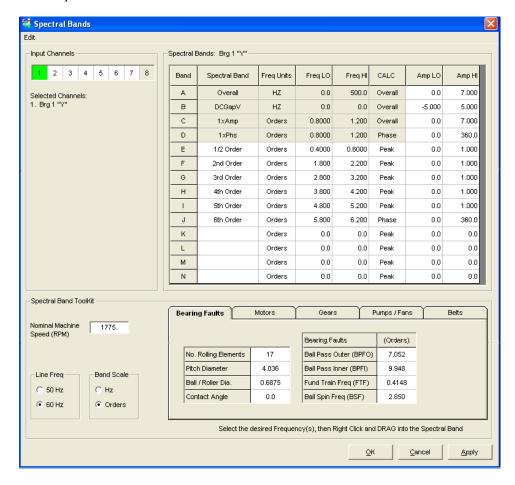




The "Spectral Bands" selection in the Edit-menu opens up a window which resembles the following. Making changes in this window will impact the Gauge Window.

Refer to Chapter 3 for details on this and other aspects of the Edit menu.





Plotting Data

Click on "**Display"** in the main window's menu bar, then select "**Plot Windows**." The Data Display Window will open. Note that you can double-click on a gauge to open the Data Display Window to plot data for that specific channel.

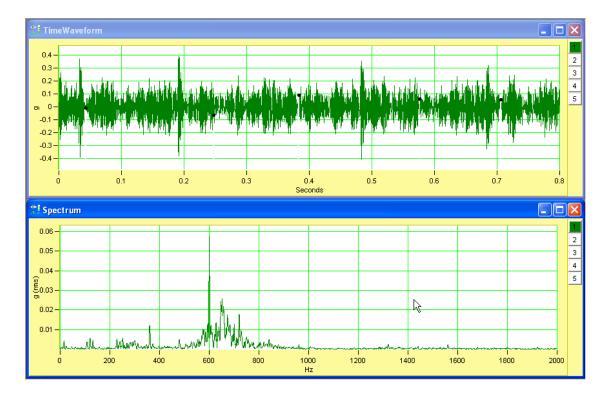
Multiple Plots

- On the second row of the Plot Windows toolbar, click the <Open New Plot Window> button (see figure). This opens a second display window. As an alternative to using the button you can open a new Window from the Window pull-down menu.
- 2. On the **Window** pull-down menu of the Plots window, select either *Tile Vertically* or *Tile Horizontally*.

All display windows will be shown simultaneously.

3. Select the Channel(s) and Display type for each window.





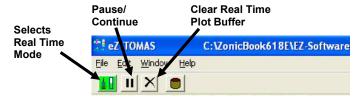
Time Display and Spectrum Display Plots Tiled Horizontally
Each plot is longer in the horizontal direction.

A **cursor** is provided with each display. To move the cursor, place your mouse icon over the cursor and drag it to the desired location on the trace or use the East / West Arrows.

"Real Time" Plot Controls

"Real Time" is the default data source. For **Real Time** displays you can **Halt and Resume** the display of data by using the **Pause/Continue** toggle button (see following figure). As an option to the **Pause/Continue** button you can use the "P" key on the PC's keyboard. A table, which identifies all control buttons follows shortly.

The **Clear Real Time Plot Buffer>** button, which looks like a black "X," allows you to clear the data in the realtime trend displays. This display option can be used to clear the plot displays prior to starting a test.



Real Time Mode is Selected



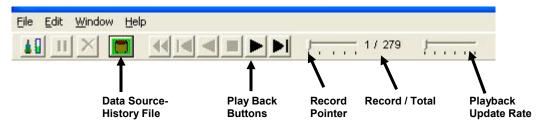
Reference Note:

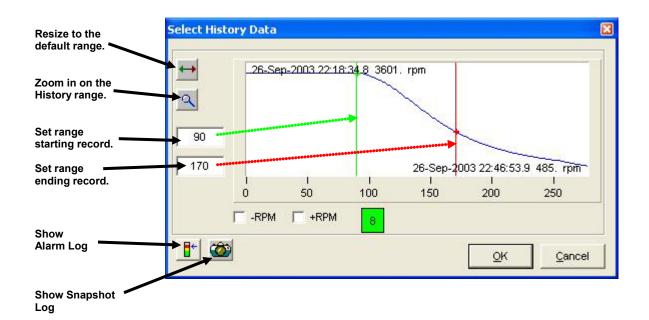
Refer to Chapter 6 for more detailed information regarding Plots and the associated toolbar buttons and other controls.

"History Data" Plot Controls

When viewing **History Data** (pre-recorded data files), you can use the set of playback buttons or the slider bar to navigate through the data. A table, which identifies all control buttons, is included in Chapter 6. Note that the playback buttons and slider remain hidden in the GUI when eZ-TOMAS is in the Real Time mode.

History Data is accumulated according to the parameters setup in the Setup Configuration window's Storage Tab, which is accessed via the Gauge Panel window's Edit Menu.







Reference Note:

Refer to Chapter 6 for more detailed information regarding Plot displays, associated toolbar buttons, and other controls.

Viewing Reports

eZ-TOMAS can generate the following types of reports, which are accessible from the **Display** pull-down menu.



Display Pull-down Menu

The **Statistical Report** lists the historical spectral band data. It includes the instrument, the engineering units, the minimum value, the mean average value, the maximum value, and the standard deviation by channel. Statistical reports can be used to automatically generate limit values based on historical data.

The **Alarm Log** is a record of the last "N" number of alarm events. The number of alarms was specified in the Setup Configuration window under the Storage Tab. The Alarm Log includes the date and time, the channel number, reference tachometer, instrument name, spectral band type, alarm type, and value of the alarm signal.

The **Snapshot Log** can be accessed from the Reports pull-down menu, or from the History Data Window. The Snapshot Log file contains entries which were created whenever the user clicked the **Snapshot**> button, which is located in the *Gauge Window's Data Storage* panel.

The **Production Test Report.** The feature allows you to generate a custom report, which can include the company logo or other graphic, such as a machine image. The Production Test Report application is primarily used by manufacturers, as it summarizes the results of each tested machine state in an easy-to-read report. The feature uses Microsoft Excel 2000 (version 9.x) or later.

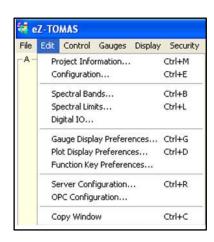
Selecting **Configuration Setup** from the Reports pull-down menu creates a text file that contains configuration details of the current project.



Reference Note:

Refer to Chapter 6, *Display... Reports*, for detailed information regarding each report type and for instructions pertaining to generating limits.

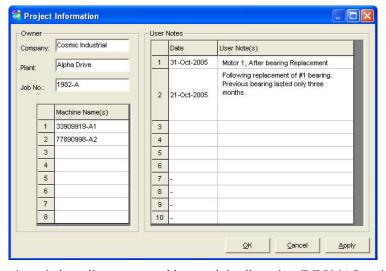
```
Project Information... (Ctrl+M) ..... 3-1
Configuration... (Ctrl+E) ..... 3-2
  Acquisition Tab..... 3-2
  Input Channels Tab ..... 3-3
  Tachometer Notes ..... 3-10
  Synopsis of Tach Modes ..... 3-11
  Storage Tab ..... 3-12
Spectral Bands... (Ctrl+B) ..... 3-15
Spectral Limits... (Ctrl+L) ..... 3-18
Digital I/O..... 3-21
Gauge Display Preferences... (Ctrl+G) ..... 3-22
Plot Display Preferences... (Ctrl+D) ...... 3-22
Function Key Preferences ..... 3-24
Server Configuration... (Ctrl+R) ..... 3-25
OPC Configuration ..... 3-24
Copy Window... (Ctrl+C) ..... 3-25
```



Note: The Edit Menu discussed in this chapter is located in the Gauge Window's menu bar. It is not to be confused with the Plot Window's Edit Menu.

Project Information... (Ctrl+M)

Edit Menu



The Project Information window allows you to add general details to the eZ-TOMAS project: Company, Plant, Job Number, and up to 8 alphanumeric Machine Names¹. Up to 10 user notes [each up to 256 characters] can be added to each project. Double-click in a text field to add or edit information.

The information in this window can be added to analysis displays as plot annotation, which can be useful when generating reports.

¹Note: When entering project information that uses an ampersand, for example "Smith @ Jones," the ampersand might not appear on reports. If this is the case, entering the ampersand twice should remedy the issue. Thus an entry of "Smith @@ Jones" would result in "Smith @ Jones."

This opens the *Setup Configuration* Window, which has three separate tabs for configuring the acquisition device. Click the appropriate tab [Acquisition, Input Channels, or Storage], make the necessary changes in each, then click the **OK**> button to save all your changes and close the window.



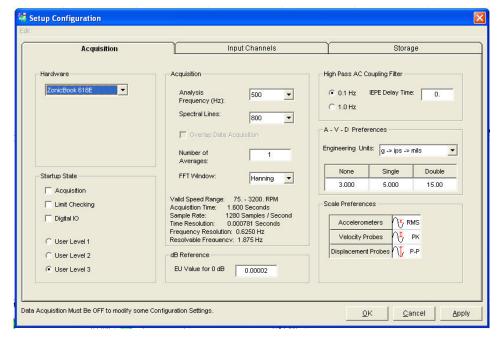
Clicking the <Cancel> button will undo all unsaved changes.

You must turn acquisition off and then on again for Acquisition Configuration changes to take effect.



If OPC is configured, the OPC settings are not automatically updated when changes are made to the channel type or spectral bands. To ensure that OPC settings remain valid bring up the OPC configuration dialog and click OK after verifying the settings.

Acquisition Tab



Acquisition Tab

The Acquisition tab is used to configure how the data will be acquired and processed. For eZ-TOMAS, **sampling rate** and **through-put** rate are determined by two user-set parameters: **Analysis Frequency** and **Spectral Lines**. The following table shows parameter relationships. Information was obtained from the above screen-shot.

Parameter	Calculation (based on above Acquisition Tab)			
Sampling Rate = Analysis Frequency x Nyquist Factor	= 500 Hz x 2.56 = 1280 samples per second	The sampling rate applies to ALL input channels.		
Time Resolution = 1 / Sampling Rate	= 1 / 1280 samples per second = 0.000781 seconds	d		
Acquisition Time = Spectral Lines / Analysis Frequency	= 800 Lines / 500 Hz = 1.6 seconds			
Frequency Resolution = Analysis Frequency / Spectral Lines	= 500 Hz / 800 Lines = 0.625 Hz			
Block of Time Data = Spectral Lines x Nyquist	= 800 x 2.56 = 2048 samples			

Panels of the Acquisition Tab

Hardware



The Hardware Panel has a pull-down list from which the applicable data acquisition device must be selected.

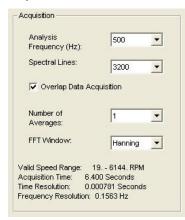
Startup State



Used to set the default startup state for the project's **Acquisition**, **Limit Checking**, and **Digital IO** processes. eZ-TOMAS will turn on the selected processes when the project is opened. The default user level (1, 2, or 3) is also selected in this panel.

- o **User Level 1** Users can view gauge data in the main menu and Print.
- User Level 2 Users cannot start or initialize a project, erase the History file, edit the configuration, or change the security password.
- User Level 3 Users have full privileges, including the ability to start new projects and erase History files. Level 3 is password protected.
 Refer to chapter 9, Security Menu for more information regarding security levels.

Acquisition



Analysis Frequency (Hz) The maximum frequency of interest. The sampling rate will be 2.56 times the analysis frequency. Verify the maximum frequency response of your probes. For a Tach signal, your Analysis Frequency should be a higher multiple of the maximum rotating speed. Typically, this multiple is at least 10 times the rotating frequency.

Spectral Lines The number of lines per spectrum and the number of data samples used in the FFT (Fast Fourier Transform) process. The more spectral lines, the greater the data resolution. As the number of spectral lines increases, so does the time that it takes to collect the data and the amount of disk space.

Overlap Data Acquisition For slow speed data acquisition applications, you have the option to select overlap data processing to speed up real time data displays. This option is enabled when the Acquisition Time is greater than 2 seconds.

If you select Overlap Data Acquisition, eZ-TOMAS will automatically determine the overlap percentage needed to achieve a 1 to 2 second display update rate. For example, if your analysis frequency is 500 Hz and you have 3200 spectral lines, the acquisition time is 6.4 seconds. With Overlap Data Acquisition, the overlap percentage will be 75% and the update rate will be 1.6 seconds. (6.4 sec / 4). The divisor is a power of 2.



Number of Averages The number of data blocks averaged before a block of data is accepted and displayed. Typically, the value is "1" indicating *no averaging*.

FFT Window Fast Fourier Transform. FFT is an efficient technique for calculating the frequency of components in a time-domain waveform based on digitized voltage measurements. The result is a display of amplitude versus frequency and phase versus frequency. The FFT Window is a weighting window, typically either Hanning or Flat Top. Hanning provides better frequency resolution. Flat Top provides better amplitude resolution.

dB Reference



This panel is used to set the 0 dB reference point in Engineering Units (EU). The EU value for 0 dB reference is used with microphone input channel types. The default setting is 20 micro-Pascals (0.000020 pa).

High Pass AC Coupling Filter (Hz)

Note: Filter Panel options apply to ZonicBook/618E and WBK18 channels.

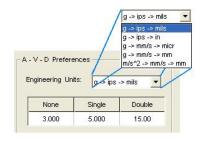


High Pass AC Coupling Filter: When AC Coupling is selected in the Input Channels tab, the associated input signals will pass through a **0.1 Hz** or a **1.0 Hz** High Pass Filter, depending on which radio button is selected.

IEPE Delay Time - The typical IEPE charge time for a 0.1 Hz AC coupling filter is 40 to 60 seconds, and 4 to 6 seconds for a 1.0 Hz AC coupling filter. While the IEPE is charging, you will see large DC offsets in the acquired data.

For this reason you may want to enter an IEPE Charge delay time. eZ-TOMAS will pause data acquisition and storage for the indicated time period.

Acceleration - Velocity - Displacement Preferences



Accelerometer and Velocity signals can be integrated. Select the desired integration units from the Engineering Units pull-down list.

The High Pass Display Filter applies to the frequency displays and calculations, such as the Overall Vibration Level. The filter values (Hz) can be defined for each integration type. Frequency data below the set filter value is zeroed. This is useful when you want to remove the "Ski-Slope" effect of integration.

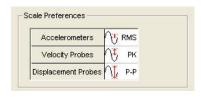
Important: Make sure the Filter Value is lower than the Machine running speed, by at least 50%.

Example: For a running speed of 1200 RPM we would need to set the filter value to 10 Hz or lower. Calculated as follows: $0.5(1200_{\rm rev}/60_{\rm sec}) = 0.5(20_{\rm rev}/_{\rm sec}) = 10$ Hz

3-4

For related information, see INT/DIFF on page 3-7.

Scale Preferences



The instrument scale preferences can be defined for Acceleration, Velocity, and Displacement input types.

You can select one of the following for each of the three instrument types:

RMS

Peak (PK)

Peak-to-Peak (P-P)

Terms and factors related to the Acquisition Panel

Nyquist Factor – The nyquist factor is a representation of the anti-aliasing cutoff frequency and is equal to the anti-aliasing cutoff frequency divided by the sample rate. In eZ-TOMAS, the analysis frequency is multiplied by a nyquist factor of 2.56 to obtain the sampling rate. This ensures that a sampled analog signal is accurately represented.

Sampling The rate at which the signal is sampled. For eZ-TOMAS, the sample rate is always 2.56 times the Analysis **Rate** Frequency.

Spectral Spectral Resolution equals the Analysis Frequency divided by the number of Spectral Lines.

Example: Analysis Frequency: 1000 Hz

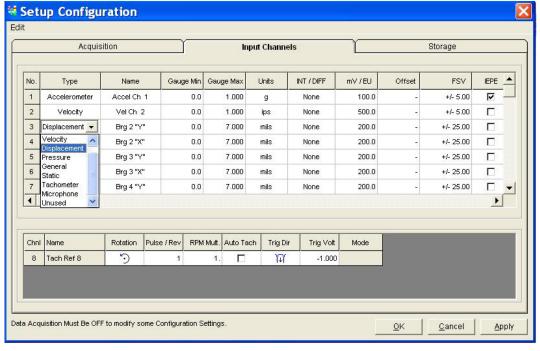
Spectral Lines: 800

Spectral Resolution: 1.25 Hz per spectral line (1000 Hz / 800 = 1.25 Hz)

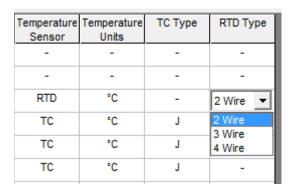
Input Channels Tab

Resolution

This tab is used to configure each channel for your project. The available setup options in this window are dependent on the instrument type selected; for example, the IOtech 655u can measure temperature and the Input Channels tab will display columns associated with Thermocouples, RTDs, and units in degrees (second figure).

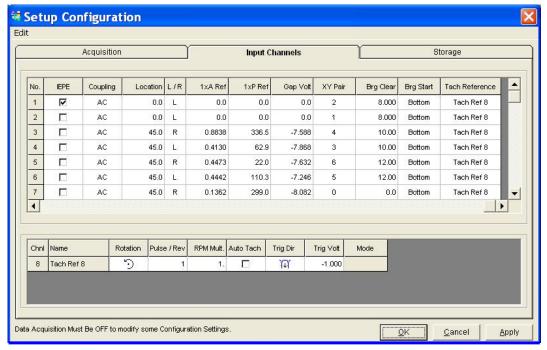


Input Channels Tab - Scrolled Left



Partial Input Channels Tab

Showing temperature related columns for an IOtech 655u.



Input Channels Tab - Scrolled Right

To configure a channel:

- 1. Select the channel to be configured.
- 2. Set the instrument type.
- 3. Set the value for each attribute of the channel.

Repeat this process for each channel.



The parameters of one channel can be copied to another channel by using options on the Edit menu.

Input Channels Tab Column Functions

No. is the channel number. Selecting the channel number highlights all attributes for that channel.

Type is the type of instrument attached to the channel. Options for channels 1 through 10 are:

Accelerometer o Microphone
Velocity o Pressure
Displacement o General

Static
 Tach
 Unused (select "Unused" for channels that have no instrument attached.)

Note: For the five temperature channels of IOtech 655u, there are two **Types** available: *Temperature* and *Unused*. *Temperature* is not an available Type for channels 1 through 10.

Name is a Label you will use to identify the channel.

Gauge Min, represent the instrument range minimum and maximum gauge values.

Gauge Max

Units is used to enter the Engineering Units label you want to use.

INT/DIFF

This column is used for setting a *single or double integration*, or a *single or double differential*. It can be used for the following three types: Accelerometer, Velocity, Displacement.

Note that the integration value (g's/ips/mils, g's/ips/in, or g's/mmps/mm) is selected in the Acquisition Tab.

Possible INT/DIFF column selections for Accelerometer, Velocity, and Displacement are:

Accelerometer	Velocity	Displacement		
None	None	None		
Single Integration	Single Integration	Single Differential		
Double Integration	Single Differential	Double Differential		

Comments:

- (1) If the signal is <u>acceleration</u>, then *single integration* results in **velocity**; and *double integration* results in **displacement**.
- (2) If the signal is <u>velocity</u>, then *single integration* results in **displacement**; and *single differential* results in **accelerometer**.
- (3) If the signal is <u>displacement</u>, then *single differential* results in **velocity**; and *double differential* results in **accelerometer**.

mV / EU

is the instrument sensitivity. (Typical displacement probes: 200 milli-Volts per mil. Typical accelerometer probes: 100 milliVolts per G. For Tach probes enter 1000.) For static channels, this property represents the slope variable (\mathbf{m}) of the linear equation $\mathbf{y} = \mathbf{m}\mathbf{x} + \mathbf{b}$.

Offset

Sets the offset factor that is to be applied to the Engineering Units.

FSV

FSV (Full Scale Voltage) is the maximum input voltage for the instrument. If you are unsure of the instrument's maximum voltage value, select a high voltage value.

IEPE

A constant bias current is available for IEPE (ICP) transducers that are used as signal input for many IOtech devices. The bias current is sourced through the center conductor of the input channel BNC connector and returns to the analyzer via the BNC's outer conductor. Consult your hardware manual for applicability.

The current source features an operating compliance voltage (see product specifications) and is protected in regard to both short-circuit and overvoltage. Operating compliance refers to the highest voltage that can be applied without change of the current source value. In the absence of a transducer, the current source will output an open circuit voltage. For applications that do not require bias, the current source can be disconnected from the input by un-checking IEPE in the Input Channels tab on a per-channel basis.

When the IEPE cell is checked for a channel, the current source is enabled and the input voltage is continuously monitored with level detection circuitry. Recognition of a voltage slightly greater than compliance voltage (transducer open) or a very low voltage (transducer short) triggers a transducer fault condition for the affected channel. When the IEPE function is not available to a channel a dash appears in the IEPE column of the associated channel.

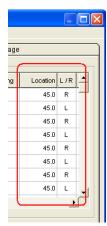
919490

Coupling

Each input can be AC or DC-coupled. The AC-Coupling High Pass Filter selection is located on the Acquisition Tab. Proximity and Static Probes are typically DC-coupled. All other types are usually AC-coupled. AC-coupling can be set to a high pass filter value of 0.1 Hz or 1 Hz. The value is selected in the Edit Menu's Acquisition Tab. Note that when DC-Coupling is selected the high pass filter is bypassed.

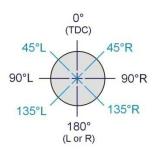
When the Coupling function is not available to a channel, or not used by a channel, a dash appears in that channel's Coupling column.

[Probe]
Location
L/R



The probe location and L/R columns are used to define the physical *angular location* of a probe, from 0° to 180° left or right of Top Dead Center (TDC). The two columns are in the Input Channels tab, as indicated in the figure below. Probe location is used for Orbit, Polar, and Shaft Center Line displays.

Note: Orientation of view is looking from the *Driver to the Driven*. Zero degrees is always given as top dead center (TDC). With eZ-TOMAS versions 5.5.09 and higher, the probe location is defined as "N" degrees Left or Right of TDC. Projects created in earlier versions of eZ-TOMAS defined location as being CCW from TDC. That convention is automatically converted to the newer one, represented in the figure at the right.



1xA Ref and 1xP Ref

1x Amplitude Reference and 1x Phase Reference are the slow roll values used for Runout Compensation on Bode, Polar, Time Waveform, or Orbit displays.

Gap Volt

is the DC voltage value when the shaft is at rest. This value is used for Shaft Center Line displays.

XY Pair

XY Pair associates 2 probes on a bearing. Typically, probe pairs are located 90 degrees apart. Orbit and Shaft Centerline displays require a Channel Pair.

Brg Clear

Bearing Clearance is measured in the instrument's engineering units. You can optionally overlay the bearing clearance circle onto an orbit display or shaft centerline.

Brg Start

Bearing Start is the location of the shaft relative to the bearing when the machine is at mechanical rest. Three possible locations are taken into consideration: Bottom, Center, and Top. For horizontal shafts, a bearing start of bottom is typical, due to gravity; However, in some situations mechanical linkage can result in a bearing start with the shaft at the top. For shafts that are oriented vertically, a bearing start of center is likely.

Tach Reference This column defines allows you to define a reference tachometer for each channel. Thus, on Gauge Display and Plot Display eZ-TOMAS can show 1x values relative to the preferred tach. When two or more tachs are defined eZ-TOMAS computes spectral data relative to each. For example, with two tachs: If Tach 1 measures 3000 rpm and Tach 2 measures 4500 rpm eZ-TOMAS computes 1xA values for each. With the RPMs given, the resulting 1x Frequency values are 50 Hz for Tach 1 and 75 Hz for Tach2.

Clicking the **Tach Reference** column brings up a pull-down list which indicates the tachometer channels available for use as reference [for the currently displayed data].

Chnl	Name	Rotation	Pulse / Rev	RPM Mult.	Auto Tach	Trig Dir	Trig Volt	Mode
8	Tach Ref 8	5	1	1.		TT	-1.0000	

Tach Section of the Input Channels Tab

Rotation is the shaft's rotation direction, either clockwise or counter-clockwise. The direction

indicated is as viewed from the driver end of the machine train.

Pulse/Rev is the number of pulses per 360 degree revolution. (Default: 1)

RPM Mult. Used to enter an RPM multiplier value. This is useful if your tachometer is measuring an

RPM that is proportional to another value of interest, such as in a gear train. For example, you want to see the RPM for shaft "X" which is known to turn at 2.5 times the RPM of gear "Z;" but it is impractical for a tachometer to measure the RPM of the shaft by any direct means. In this case, we would enter a multiplier of 2.5 for the gear's RPM

to obtain the shaft's RPM.

Auto Tach If a Analog Input Channel is defined as a Tachometer Input. You can either manually

specify a trigger level or use the Auto-Tach detection option.

During acquisition eZ-TOMAS can automatically detect and adjust the analog tach's trigger settings. This can be useful when the tach signal changes voltage levels during

machine operation.

Trig Dir is the "negative' [down arrow] or "positive" [up arrow] direction of the moving shaft.

Trig Volt defines the Tach pulse for tach signals. A **keyway** will generate a Negative Tach pulse.

Typical Tach signals will generate at least a 1 V pulse. You can check the voltage value

using a Time display.

Mode Used to select one of three available modes: Voltage, Counter, or Period.

Tachometer Notes

Tacnometer	<u> </u>
To Assign a Tachometer	1. Navigate in eZ-TOMAS as follows: Edit [pull-down men] \ Configuration \ Input Channels Tab \ Tach Reference column.
to a Channel	2. Click in the Tach Reference column and select the desired tachometer from the pull-down list.
To Edit a Tachometer	1. Navigate in eZ-TOMAS as follows: Edit [pull-down menu] \ Configuration Input Channels tab.
Channel's Parameters	 Edit the parameters on a column by column basis, as desired. Note that ther are two places from which you can edit tachometer parameters: (a) The main area of the Input Channels tab. This is where, for a Tachometer type, you can edit the tachometer channel's name, minimum and maximum gauge values, units, etc. (b) The lower panel of the Input Channels tab. From here you can configure the tachometer channel's rotation (CW or CCW), trigger/revolution, trigger direction (POS or NEG), and trigger voltage. For applicable illustrations of the channel configuration areas, refer to the
	preceding two figures.
To obtain optimal noise	1. Setup the input for Voltage Mode.
rejection	2. Take a measurement.
	3. View the Tach Signal on a TimeWaveform plot.
	4. Set the Trigger Slope [Trig Slope] to Positive (POS) or Negative (NEG).
Using Analog Input as a Tach	1. If you connect a tachometer sensor to an analog signal input channel (e.g., CH1 through CH8) [instead of to a dedicated tach channel], the tachometer modes will not be applicable to that channel.
	2. Tach calculations [using an analog input] automatically remove offset. For this reason you must specify the tach trigger voltage [for the tach channel] a though the channel was AC coupled.
	3. Though offset is automatically removed, it can be displayed using DC coupling.
	4. The gauge max value [for an analog channel used as a tach] is used to ignor spurious tach pulses, i.e., anything above the gauge max value. For this reason care must be taken to set the max gauge value correctly when any analog channel is used as a tach.

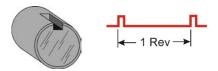
Synopsis of Tach Modes

When you connect a tach sensor to a tachometer designated connector, such as the ZonicBook/618E's TACH BNCs (TACH1, TACH2, TACH3, or TACH4) you can select one of the following three modes: Counter, Period, or Voltage.



If tachometer triggers will occur at a rate greater than or equal to the "scan rate divided by 10" then the Period Mode must be used.

Counter Mode



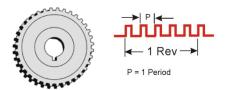
Use Counter Mode when Pulses per Revolution are needed.

Counter Mode can be used for phase shift observance.

Counter Mode generates a Pulse of Amplitude "+1" for each tach trigger. The counter mode can be used when the number of pulses is less than the scan rate divided by ten (< scan rate / 10).

Once you have established the phase relationship of a machine running near optimum, the observance of phase shifts can be used to signal the development of a mechanical problem.

Period Mode



Use Period Mode when multiple pulses are involved, such as from gear

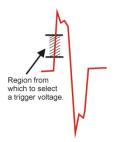
Period Mode cannot be used for phase shift observance.

The period is the time from the rising edge of one pulse to the rising edge of the next pulse, or the time from the falling edge of one pulse to the falling edge of the next pulse.

The Period Mode is used for Tachometer inputs which exhibit multiple pulses per revolution. The mode provides accurate overall RPM without sacrificing scan rate. Phase measurements are not possible when using period mode.

Note: 60 seconds divided by the period [in seconds] equals RPM.

Voltage Mode



Use Voltage Mode when you need to determine a trigger voltage.

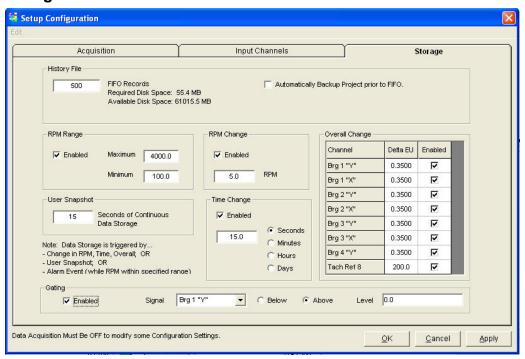
Voltage Mode is used for Tachometer inputs to view actual input voltages from the Tach Sensor. This mode is useful for locating an ideal Tach Trigger Voltage setting, i.e., one that is in a clean region of a leading edge, as illustrated.

Notes:

- Voltage mode cannot be used for phase measurements between analog inputs and tachometer inputs.
- When in voltage mode, a displayed hardware tach 2) channel will always show existing offset, if present.
- When specifying the voltage for a hardware tach trigger, consider whether the channel is AC or DC coupled.

3-11

Storage Tab



Storage Tab

Basic Description

Data storage is activated by trigger events. If any one event is triggered, data from all channels is stored. Data storage events are triggered when a change occurs within the range of your defined parameters. An example follows the parameter definitions.

Note: For Static Input Channel types (selected in the Input Channels "Type" column) eZ-TOMAS calculates and stores the averaged value in the time block.

Panel	Description
History FIFO	Displays the number of storage records in the History FIFO (First-In-First-Out) file. Based on the configuration, values for both the required and the available disk space are shown. The panel includes a checkbox to enable backing up the project. If the project backup feature is enabled, the backup files will be stored in your EZ-TOMAS project folder. They will have the same file name, followed by an underscore and a number; for example, the first backup of a file called: TurbGen.tom would be TurbGen_1.tom.
RPM Range	The speed range in which data storage is permitted.
RPM Change	An RPM-based trigger for the storage of data. Data will be stored when the machine speed changes by the specified RPM value. To enable the delta RPM storage trigger check the "Enabled" checkbox and enter an RPM value.
Time Change	A time-based trigger for the storage of data. Enter the number of seconds, minutes, hours, or days between desired storage events. To enable the time-based trigger check the "Enabled" checkbox.
Overall Change	An amplitude-based trigger that can be defined for each channel. Data is stored when the overall amplitude changes by the specified value. The user must check the "Enabled" box for each channel that is to be used as an overall change trigger.

User Snapshot Used to specify the duration of continuous data gathering (in seconds) for a snapshot

of data. When the snapshot button is clicked [the button with the camera image], data

will be collected for the specified duration.

Gating (Signal Gating)

Allows a designated state of a selected input signal to control *storage* and *limit checking* operations. Refer to the following page for details.

The history file is a FIFO file. You can define the depth of the history file; however, the amount of time

needed to fill the file depends on the trigger event values. The smaller the trigger values, the faster the history file fills. The current data storage status is shown in the *Main* Window.

Example

Assume that a motor typically runs at 3600 RPM and we would like to store data when the motor is running above 200 RPM and below 5000 RPM.

- 1. Open the Edit menu.
- 2. Select "Setup." The Setup Configuration window will open.
- 3. Select "Storage Tab."
- 4. For RPM Range enter a value of 5000 for the maximum and 200 for the minimum.



- 5. Set one or more of the following to trigger data storage:
 - a) Time Change
 - b) RPM Change
 - c) Overall Change (the overall change in engineering units)

For this example assume that Time Change and RPM Change were both set to "None" and the Overall Change trigger for a channel was set to set to 0.25 mils.

6. Click <OK>.

With this configuration, data will be stored if ... the motor's speed is greater than 200 RPM and less than 5000 RPM and the overall value changes by 0.25 mils [since the last trigger event]. In this case

eZ-TOMAS will store time waveform and spectral gauge (band) data for all channels. All event triggers are reset whenever any event trigger occurs. In other words:

IF minRPM < Motor Speed < maxRPM

AND IF {delta Time, OR delta Speed, OR delta EU = specified setting}

THEN data is stored.

Gating (Signal Gating)

Signal gating allows a designated state of a selected input signal to control *storage* and *limit checking* operations.

The signal state sensed is strictly level based, in other words, *above* or *below* a designated overall level in scaled units. Use of a signal for gating does not change the configuration or operations of that signal.

Setup of the gating feature is accomplished within the Storage tab, located in the Storage Configuration dialog (Edit Configuration). An example, showing Gating enabled, is presented by way of the following figure.

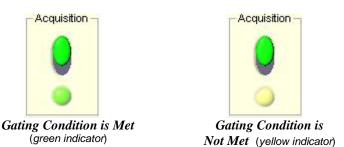


Gating Panel, Located within the Storage Tab

When gating is *disabled* the system ignores all gating specifications, i.e., the panel's indicated signal channel, above/below state, and level value parameters have no effect. This means eZ-TOMAS will check limits and storage specifications with no imposed restrictions.

When gating is *enabled* you can select an input signal from the Signal pull-down list. In the previous figure, Accelerometer Channel 2 (Accel Ch 2) is selected.

The *above/below* radio buttons indicate that gating (or enabling) of system operation will occur when the overall value of the specified signal is above or below (respectively) the level specified in the Level field. When gating is enabled and the set condition is met a green indicator will display below the Acquisition switch.

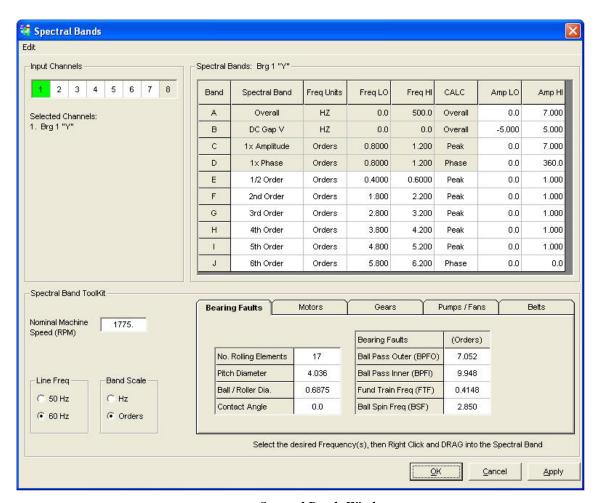


When the gating condition is not met, but gating is enabled, a yellow indicator will appear beneath the Acquisition switch.

Note that there is no indicator when gating is disabled.

Up to 14 Spectral Bands (A through N) can be selected for each dynamic channel. The first four bands (A, B, C, D) named Overall, DC Gap V, 1x Amplitude and 1x Phase are pre-defined and cannot be modified. However, the user-defined bands (E through N) can be customized for specific applications.

Spectral Band values are displayed on the dynamic instrument gauges. All gauges are vertical, with exception of circular phase gauges. When either 1x Amplitude, or 1x Phase is selected, both a vertical gauge [for 1x Amplitude] and circular phase gauge [for 1x Phase] are displayed.



Spectral Bands Window



If OPC is configured, the OPC settings are not automatically updated when changes are made to the channel type or spectral bands. To ensure that OPC settings remain valid bring up the OPC configuration dialog and click OK after verifying the settings.

Input Channels Panel

Selected channels have green backgrounds. Non-selected channels appear with white backgrounds. Selected channels are listed by channel number and name. The channel name is the one that is assigned in the Input Channels tab of the Edit menu's Setup Configuration window, under the "Name" column.

Spectral Bands Panel

is the Spectral Band of interest. Only the "User Defined" bands [E through N] can **Band** (A thru N) be modified. Spectral is the name you assign to a spectral band. It is displayed on the dynamic instrument Band gauge in the main window. A, B, C, and D are pre-defined. can be either Frequency or Orders. If you do not have a tach defined, the Orders Freq Units option will not be available. Freq LO Used to set the range of the frequency or order. It is a good practice to set the range Freq HI 2 to 4 spectral lines wider than the frequency of interest. This is due to the FFT window. For example, if your frequency of interest is the 3rd order. You should specify a range of 2.9 to 3.1 orders **CALC** Specifies to calculate Peak, Overall, Phase, or Unused. **Peak** is the highest spectral amplitude within the specified range. Overall is the sum of vibrations of each spectral amplitude, within the specified range. **Phase** is the time relationship between the vibration probe and tach signal. **Unused** does not calculate a value for the spectral band.

The lower portion of the Spectral Bands Window consists of a Spectral Band Toolkit panel. The toolkit includes a field to enter machine speed in RPM, selection for 50 or 60 Hz line frequency, and selection for a band scale in Hz or Orders. Aside from these, the toolkit includes 5 tabs: Bearing Faults, Motors, Gears, Pumps / Fans, and Belts.

Used to set the low and high amplitudes. These high and low values define the gauge

Spectral Band Toolkit Panel

Nominal Enter the machine's nominal running speed.

Machine Speed

(RPM)

Amp LO

Amp HI

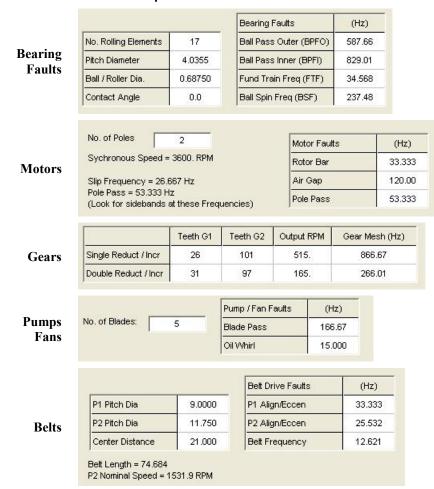
Line Frequency Select 60 Hz or 50 Hz, depending on the frequency of the power supply.

Band Scale Choose Hz or Orders.

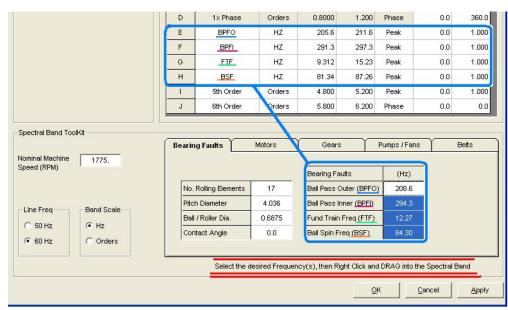
Examples from the toolkit tabs follow.

range.

Spectral Band Toolkit Tabs - Examples



Each of the tabs includes parameters related to a specific type of fault. The tabs calculate and display frequencies [or orders] which you can select with the left mouse button, then [with a click of the right mouse button] drag into the Spectral Bands panel. In the following figure, 4 frequencies associated with bearing faults have been highlighted and dragged into position for spectral bands E, F, G, and H.



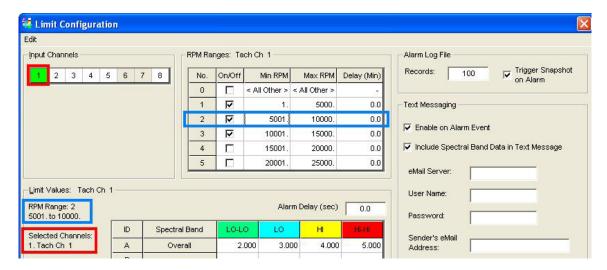
Applying Bearing Fault Frequencies from the Toolkit to Bands E, F, G, and H

Overview

The Limit Configuration window is accessed from the Edit pull-down menu by selecting "Spectral Limits." The window provides the user with a means of setting limits and ranges for multiple machine states for 1 or more Input Channels.

A machine state can be defined by RPM and Delay Time (minutes). For example, a machine state could be defined as 5001 to 10,000 RPM, but with a delay of 3minutes. Thus the speed would need to be at least 5001 RPM for 3 minutes.

Six states are supported, where "0" is an RPM state not covered by the defined RPM ranges 1, 2, 3, 4, 5. See top central panel, following figure.



There can be gaps between user-defined RPM ranges; however, the ranges may not overlap. For example: Range 1 could be assigned to cover 400 to 800 RPM, and Range 2 could be set to cover 900 to 1000 RPM, thus ignoring the 801 to 899 RPM range. But you could not then reset Range 2 to cover 700 to 1000 RPM because this new range 2 value overlaps those of Range 1. When RPM ranges are used, there is a unique set of limit set-points for each combination of: Input Channel, RPM Range, and Spectral Band. For convenience, you may copy and paste limit settings between Channels.

A different set of Limit Values for Spectral Bands A through J can be assigned to each of the six RPM ranges. Click on one of the cells for an RPM range to see the limits assigned to that range. The range currently selected is listed at the left side of the Limit Values panel. In the above figure RPM Range 2 (5001 to 10,000) RPM is selected.

Up to four limits can be defined for each channel's operating condition (LO-LO, LO, HI, HI-HI). The alarm colors are defined in the Plot Display Preferences window. If the channel value is lower than the LO-LO limit, the bar graph will change to the color indicated in the LO-LO column header (see following figure). A value between LO-LO and LO limits will cause the bar graph color to change to the specified LO limit color. HI and HI-HI limits have the same effect, relative to channel value. A bar will be green for normal channel values (those between the LO and Hi limits).

The window includes a Text Messaging feature that allows a message to be sent to up to 5 e-mail addresses. Such messages are typically sent when triggered by an alarm condition. The user can elect to include Spectral Band Data in the message by checking the associated checkbox.

Facts Regarding Spectral Limits

- To configure two or more channels to the same limit settings, you can click on the first channel; then use <Shift>/click, or <Control>/click to select the range of channels that are to have the common limits.
- Limit values are not used if:
 - (a) the limit value is outside of the instrument range, or
 - (b) the limit value is set to Zero.
- Limits from one channel can be copied to another from the Limit Configuration Window's Edit pull-down menu, using the "Copy Channel" option, or by selecting multiple channels.
- Use the Input Channels Tab of the Configuration Window (selected from the Edit pull-down menu) to Select the Tach Reference on a per channel basis.
- You can modify limits on the graphical bar graph display in the main window by dragging the *limit arrows* and then opening the Spectral Limits window to save your changes. Note that right-clicking on a gauge activates a pop-up [following figure] with several selection options, including "Edit Spectral Limits."

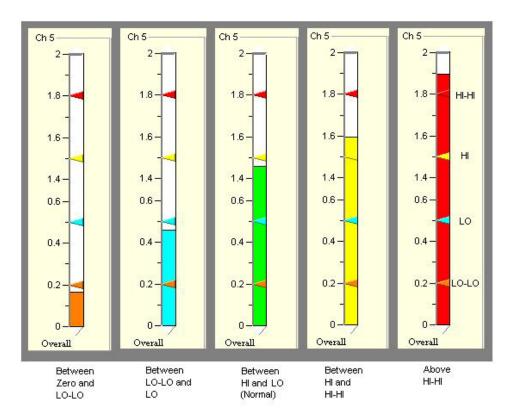


Gauge Window Pop-up

- The Alarm Log File panel [upper right of the Limit Configuration window] has a numeric field for entering "Records" is the number of Alarm events logged. When an alarm occurs, eZ-TOMAS automatically saves the data to the History FIFO file.
- The colors for the four limits (set in Edit Menu / Plot Display Preferences) are used in the Gauge Window, as illustrated in the following figure.
- The Statistical Report can be used to generate limits for each machine state. You can select channels, spectral bands, and variance for high and low limits. A Limit Generation dialog box is accessed via the Statistical Report's File pull-down menu.

Spectral Band	LO-LO	LO	н	HI-HI
Overall	0.2000	0.5000	1.500	1.800
DC Gap V	1.000	2.000	3.000	4.000
1x Amplitude	0.5000	0.7000	0.8000	0.9000

Partial Spectral Limits Panel Showing User-set Color Indications for LO-LO, LO, HI, and HI-HI



Example of Limits Effects on the Gauge Colors

Note: The Statistical Report can be used to generate limits for each machine state. You can select channels, spectral bands, and variance for high and low limits. The Limit Generation dialog box is accessed via the Statistical Report's File pull-down menu. See Chapter 8 for more information.

Digital I/O... Edit Menu

Hardware Panel

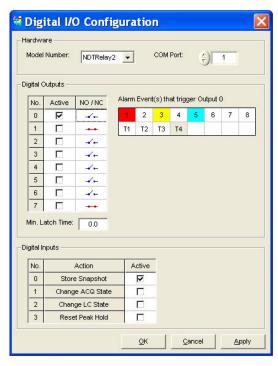
The top panel of the Digital I/O Configuration Window is the Hardware panel.

For NDT Relay Modules:

- (1) An NDTRelay must be connected as indicated in separate NDTRelay documentation.
- (2) The applicable **COM Port** must be identified. Select the RS232 COM (serial) Port to which the output Relay module is connected

For 600 Series Analyzers:

For these 600 series analyzers, the Digital outputs are accessed via a 9-pin connector on the rear panel. Refer to the associated product's user manual for a pinout and additional details. The manuals are located on the *Dynamic Signal Analysis* CD in Adobe PDF format.



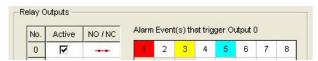
Digital I/O Configuration

Relay Outputs Panel

Relay outputs can be used to communicate Alarm Status to external devices. Up to 8 relay outputs are supported. You must indicate, by checkmark, if a relay output is to be active. For an "active" relay, the normal state is either Normally Open (NO) or Normally Closed (NC). In the preceding figure, only Relay Output 0 is "Active."

When you click on one of the cells associated with a relay output, the "Alarm Events" that will trigger it appear to the right of the output's switch graphic. In the preceding figure we see the events that will trigger Relay Output 0. When any of the defined Alarm Events are True, the relay will be in the state other than indicated in the NO/NC column. For example, in the following figure Output Relay 0 is normally closed; thus the relay will open when:

- (a) Input Channel 1 is in Red Alarm Condition, or
- (b) Input Channel 3 is in Yellow Alarm Condition, or
- (c) Input Channel 5 is in Cyan Alarm Condition.



Output Relay 0, Active, Normally Closed –
Shown set to Open on Alarm Conditions on Channels 1, 3, or 5

Digital Inputs Panel

Digital Inputs can be used to trigger eZ-TOMAS Actions. Each supported action is assigned to specific Digital Input. For example, in the figure at the right, Store Snapshot is assigned to Digital Input 0. This means that the Store Snapshot action will occur when Digital Input 0 changes state.

Note: Digital Inputs are available in NDTRelay2 [not NDTRelay1].



Store Snapshot Selected for Digital Pattern 0

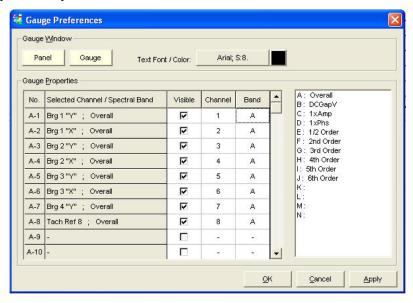
Note: Each number in the "No." column represents a specific Digital Pattern.

Gauge Display Preferences... (Ctrl+G)

Edit Menu

The G auge P references window p rovides a means of independently setting the background colors of the c ontrol p anel and p rimary gauge panel. The Gauge Preferences window includes a font styles button which allows you to apply a global f ont c hange t othe g auge and c ontrol panels. The lower section of the Gauge Preferences window pertains to Gauge Properties. In regard to the "Bands" column, to make a change you can draganew Spectral Band type from the farright into the Band column. You can also double-click in a cell and enter a desired Spectral Band letter (from Athrough N). Channels can be edited in a similar manner.

655u Note: When a temperature channel is selected only two spectral bands will be listed at the right side of the window; these are 'A:Overall' and 'B:DCGapV.'



Plot Display Preferences... (Ctrl+D)

Edit Menu

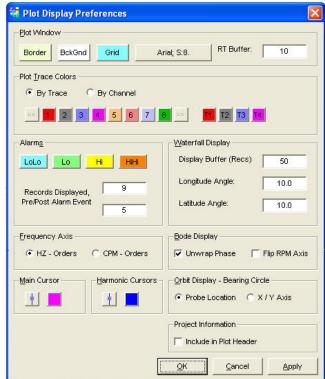
The Display Preferences Window provides a means of changing various display colors for the Plot Window. It also allows you to change other display parameters, including, but not limited to, W aterfall la titude and longitude angles, and units for the frequency axis.

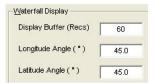
Although most d isplay p reference functionality is s elfexplanatory, the following information may be useful to some.

The *Plot Window panel* allows you to define the Plot Display's border, ba ckground, g rid c olors, a nd t he font style a nd s ize. The p anel i ncludes a n RT B uffer numeric field for indicating Realtime Trend. This value defines the amount time [in minutes] that data will be displayed before scrolling will begin. For example, if the Realtime Trend was set for 2 minutes the trend d isplay would s how t he d ata b eing c ollected f or t wo minutes, a nd t hen s tart s crolling a fter 2 m inutes. I n t his example t he s creen will al ways d isplay t he most r ecent 2 minutes of data.

The *Plot Trace Colors panel* allows you to define colors for use in the plot displays. I f you select "By Trace" the sequential order of the Trace Number will define the plot color. I f you select "By C hannel" colors will be a ssigned to specific channels according to the numbered color squares.

The *Alarms panel* defines alarm colors. The panel includes two numeric fields. The upper field indicates the number of records to be displayed. The lower field, for Pre/Post Alarm Event, defines the amount of data that will be displayed when using the Alarm Log report.





The *Waterfall Display panel* is limited to a fixed number of spectrum traces, up to 100 traces. The Longitude Angle defines the vertical tilt of the display. The Latitude Angle defines the horizontal tilt.



The *Frequency Axis panel* is used to set the frequency axis to Hz or CPM. Select **Hz-Orders** for *cycles per second*; or select **CPM-Orders** for *cycles per minute*.



The *Bode Display panel* includes two checkboxes: Unwrap Phase and Flip RPM Axis.

<u>Unwrap Phase</u> – when "checked," the Y-axis scale can span multiple 360 degrees. Data will smoothly transition across the 0 / 360 boundary. When "not-checked" the Y-axis scale is 0 to 360 degrees; and data that straddles the 0 / 360 boundary will show a vertical line.

<u>Flip RPM Axis</u> – is typically used for shutdowns (coastdowns). When "checked," the X-Axis (for RPM) reverses. Thus an X-axis from 0 to 6000 RPM would "flip" to show 6000 to 0 RPM.



In addition to color changes, the *Main Cursor* and *Harmonic Cursors* can be shown with or without a vertical line. Click on the first button [in the associated cursor panel to toggle to the desired choice (line or no line).



The Orbit Display - Bearing Circle panel allows the user to select "Probe Location" or "X / Y Axis." The selection defines the Bearing Circle on the Orbit display. If the bearing clearance is elliptical, select the locations that will be used to measure the clearance.



When checked, the following information will appear in the header when you copy and paste a plot into a document or paint application: *Company, Plant, Job No., Machine Name(s)*. This information will be as entered in the Project Information window, which is accessed from the Edit menu.

Function Keys Preferences...

Edit Menu

eZ-TOMAS can be controlled through a network via keyboard function keys (F1 through F12). The Function Key Preferences feature allows you to define computer keyboard function key actions.

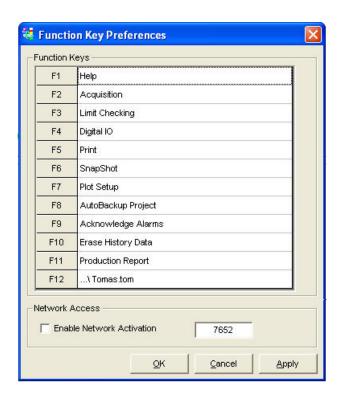
Note: When you click on a Function Key row (such as F5 in the figure) a pull-down list appears – allowing for easy selection of a function.

You can assign the keys to control starting and stopping acquisitions, limit checking, data storage, and to indicate what project is open. Network Communication is via Port 7652.

You can assign the "File – AutoBackup" menu option to a function key. The AutoBackup feature allows you quickly backup the current eZ-TOMAS Project. When this function is use a date and time string is added to the project name. Note that the File Attributes of the backed up project are *Read Only*. The AutoBackup feature can be useful in Conjunction with the Network access of the function keys.

You may contact IOtech for an example application.

If doing so, please request: **EZT netfkey**.



Server Configuration... (Ctrl+R)

Edit Menu

eZ-TOMAS can be configured to provide *data* and/or *control* to remote computers using a client/server architecture via TCP/IP. The remote computers will need to have an authorized version of the *eZ-TOMAS Remote* application of the same version number as the eZ-TOMAS software being used.

Refer to Chapter 11, Using eZ-TOMAS Remote, for details regarding server configuration.

OPC Configuration...

Edit Menu

eZ-TOMAS can act as an OPC server to publish its gauge data items as OPC tags. OPC clients can connect to the server to obtain data acquisition values as they are being produced by eZ-TOMAS.

Refer to Chapter 10, OPC Support for eZ-TOMAS Gauge Data, for details.

Copy Window... (Ctrl+C)

Edit Menu

"Copy Window" is not a window, but a command to copy the currently selected window to the clipboard. After using this command you can paste the copied window into another application, such as Microsoft Word or Excel. The feature is useful for creating reports, or sending screen images to others via e-mail.

The Control Menu allows you to enable and disable several functions which can also be controlled via switches and buttons on the lower panels of the Gauge Window (main window) as discussed in Chapter 1.

If needed, refer to Chapter 1 for information regarding the selections, as well as the relationship between the menu items and the Gauge Window buttons.



Control Pull-Down Menu

Introduction 5-1
Saving and Recalling Plot Setups 5-3
Changing Display Ranges and Scales 5-4
"Real Time" Plot Controls 5-5
"History Data" Plot Controls 5-5
Channels 5-7

Introduction

The Display pull-down menu [following figure] provides a means of displaying plot windows, logs, and reports. This chapter covers the Plot Windows aspect. Chapter 6 pertains to the various logs (reports) that can be generated from the menu.



Select Plots from the Display Pull-down Menu

Selecting **Plot Windows** from the Display pull-down menu opens a *Data Display window* (see following Window). Note that you can double-click on a gauge to open a Data Display window for plotting that gauge's data.

For real-time displays, you can halt and resume the display of data by using the Pause/Continue toggle button, or use the "P" key on the keyboard. When viewing historical data, you can use the playback buttons and the slider to navigate through the data.

You can view either real-time data or historical data. In the examples that follow we are view historical data, thus the History button has been clicked, and appears "active" [green] on our screen.

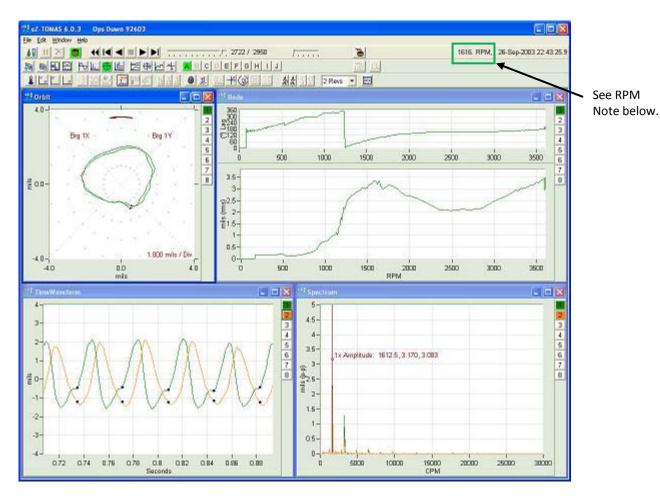
Prior to viewing a plot you need to:

- select the channels to be displayed
- select the desired data display format, e.g., Time Display, Spectrum, or Waterfall
- select the data source, i.e., a "Real Time" source, or a history data file.



Reference Notes:

For toolbar button functions refer to Chapter 6. For examples of various plot display types refer to Chapter 7.



History Data - Orbit, Bode, Time Waveform, and Spectrum Displays

Plot controls can be data that is in "Real Time" or pre-recorded, i.e., "History Data." A different set of control buttons will be present depending on which mode you are using. In addition, Time Display and Spectrum Display formats differ in regard to certain control options.



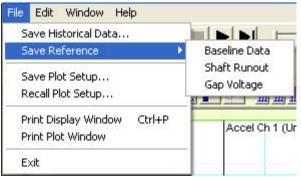
Reference Notes:

For toolbar button functions refer to Chapter 6. For examples of various plot display types refer to Chapter 7.

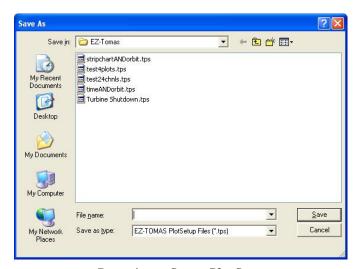
RPM In *real-time* or *history mode*, RPM associated with up to 18 defined tachometer channels is **Note**: displayed in the upper left hand edge of the display panel. For projects using more than 18 tachometers, you can use strip chart plot windows to specify the additional RPM values.

Saving and Recalling Plot Setups

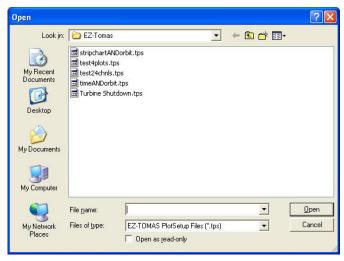
You can save and recall plot setups. If you typically need to display data in a fixed format, this option can simplify the display setup process. After you can setup your plot displays, select the "Save Plot Setup" file menu option and save the setup. The next time you need to display data in that format, you can use the "Recall Plot Setup" file menu option to quickly display data in that format.



File Pull-down Menu for Plot Displays

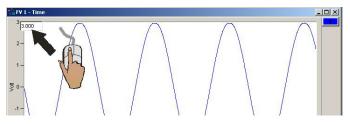


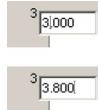
Preparing to Save a Plot Setup



Preparing to Recall [Open] a Plot Setup

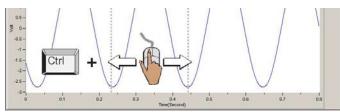
Changing Display Ranges and Scales To change the maximum or minimum range value (following figure): Left-click on upper or lower scale value that is to be changed, then enter the new value. An example follows. This technique works for both X and Y axis.

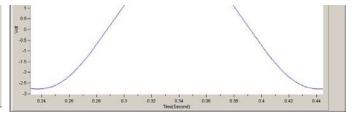




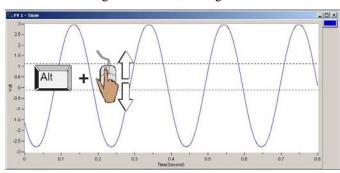
In this example, the cursor and PC keyboard were used to change the maximum scale value from 3.000 volts to 3.800 volts.

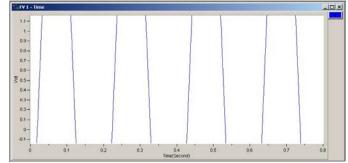
To change the X-Axis (following figures): Hold down the <Ctrl> key, at the same time, left-click and drag the mouse cursor horizontally on the plot. Two vertical cursor lines will define the new x-axis end points. As an alternative, you can click the X-Scaling button and then drag the mouse cursor horizontally on the plot.





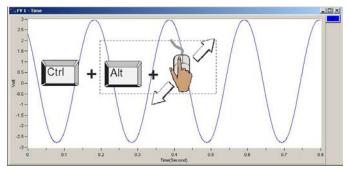
To change the Y-Axis (following figures): Hold down the <Alt> key, at the same time, left-click and drag the mouse cursor vertically on the plot. Two horizontal cursor lines will define the new Y-axis end-points. As an alternative, you can click the Y-Scaling button and then drag the mouse cursor vertically on the plot.

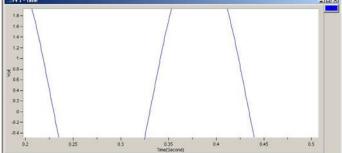




To simultaneously change the X & Y Axes (following figures): Hold down the <Ctrl> and <Alt> keys, at the same time, left-click and drag the mouse cursor diagonally on the plot. A rectangle will define the new area of the plot. As an alternative, you can click the X-Y-Scaling button and then drag the mouse cursor diagonally on the plot.

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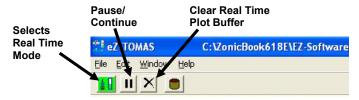


Note: In regard to using toolbar buttons to change axis ranges, refer to Chapter 6.

"Real Time" Plot Controls

"Real Time" is the default data source. For **Real Time** displays you can **Halt and Resume** the display of data by using the **Pause/Continue** toggle button (see following figure). As an option to the **Pause/Continue** button you can use the "P" key on the PC's keyboard. A table, which identifies all control buttons follows shortly.

The **Clear Real Time Plot Buffer>** button, which looks like a black "X," allows you to clear the data in the realtime trend displays. This display option can be used to clear the plot displays prior to starting a test.

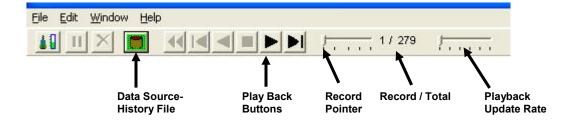


Real Time Mode is Selected

"History Data" Plot Controls

When viewing **History Data** (pre-recorded data files), you can use the set of playback buttons or the slider bar to navigate through the data. A table, which identifies all control buttons, is presented in Chapter 6. Note that the playback buttons and slider remain hidden in the GUI when eZ-TOMAS is in the Real Time mode.

History Data is accumulated according to the parameters setup in the Setup Configuration window's Storage Tab, which is accessed via the Gauge Panel window's Edit Menu.

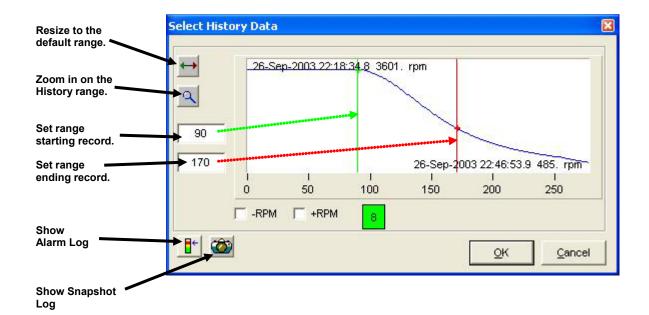


History Data (Playback) Mode is Selected

The playback buttons from left to right are: Rewind, Step backward one record, Play Backward, Stop, Play, and Step forward one record

Note that you can drag the History Data Slider (at the right of the play buttons) to a specific area of the file before you start playing back the data.

The Playback Update [Delay] Slider allows you to slow down (delay) the playback update. The delay value can be set to anywhere from 0 to 1000 milliseconds, in 200 millisecond increments.





Reference Note:

Refer to Chapter 6 for more detailed information regarding Plot displays, associated toolbar buttons, and other controls.

The default is the entire history file. To change the start and end dates drag the green and red bands to the desired start and stop times, respectively. As an alternative, you can enter the record numbers in the numeric fields for starting and ending records. After defining the range, click <OK>.

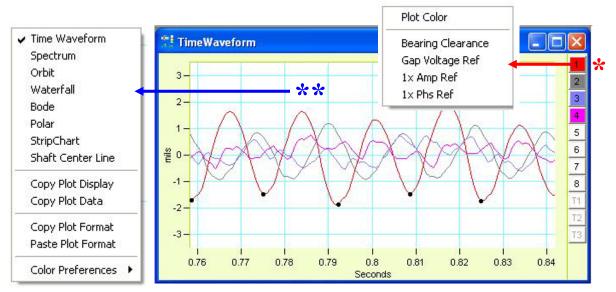
From the plot window, click the play button to play back the file.

The History Data window includes a **Show Alarm Log** button. Click the button to open a table of alarm events that are included in the file (if applicable). You can select an alarm event to display the data that surrounds the event.

The History Data window also includes a **Show Snapshot Log** button. Click the button to open a list of data snapshots. You can select a snapshot from the list to view it in the plot window.

RPM Filter – This feature eliminates hysterisis and is therefore useful for trend displays, e.g., Stripchart, Polar, Shaft Centerline and Bode. If the RPM Filter checkbox is checked eZ-TOMAS will only display data for increasing or decreasing RPM.

Channels



A Time Waveform Display of 4 Channels

- * Right-clicking on a channel button brings up a menu (see figure) which allows for changing some of the display characteristics for that channel, such as the color of the plot [channel trace].
- ** Right-clicking anywhere in the plot display area brings up a menu of many display options. Refer to the menu at the left, in the above figure.

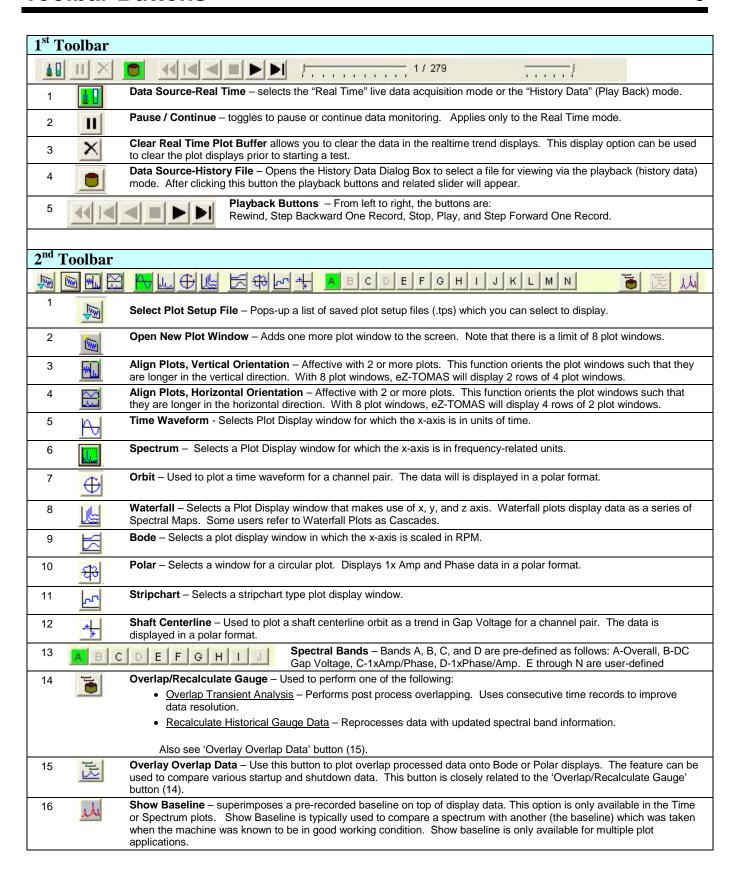
The vertical channel bar at the right-hand edge of each plot represents the input channels. The number of channels that can be displayed is dependent on the plot display format. Some points regarding channels follow.

- A **color-filled channel box** indicates that the channel is currently being displayed as a trace of matching color.
- A white channel box indicates that the channel is active, but is not being displayed.
- A dimmed channel number is not active, thus there is no data to display.
- **Multiple channels** can be plotted on Time, Spectrum, Strip Chart, and Bode displays. Examples of plot types are provided in Chapter 7.
- A single channel can be plotted on Waterfall, Polar, and Shaft Center Line displays.
- For **Orbit** displays and for **Shaft Centerline** displays, the time display of a channel pair is displayed.



Reference Notes:

For toolbar button functions refer to Chapter 6. For examples of various plot display types refer to Chapter 7.



3 rd Toolbar					
1		I I M B L KAN R L L L Q C L L L L L L L L L L L L L L L			
1		Scale – Toggles between Instrument Scale, Auto Scale, and User Scale. Instrument Scale is shown in the figure.			
		Instrument Scale is the default. It displays the data based on the instrument's Engineering Units range. Instrument Scale			
		Auto Scale automatically scales the axes based on the data being displayed. Auto Scale			
		User Scale is used to display data in relation to a user-defined scale. You can quickly customize a scale as follows:			
		 (1) press the <ctrl> + <alt> keys and hold them in.</alt></ctrl> (2) press the <left button="" mouse=""> and hold in</left> (3) move the mouse cursor to draw a rectangle around the area of the plot that you desire to view. (4) release the mouse button and the two keys. Your plot should now have a new and more practical scale. 			
2	Ľ×	Manually Scale X and Y Axis – A diagonally oriented dual-arrow cursor appears. The cursor lets the user simultaneously adjust both the X-axis and Y-axis by dragging the mouse.			
3		Manually Scale Y Axis – A vertical dual-arrow cursor appears. The cursor lets the user manually adjust the Y-axis by dragging the mouse.			
4	Lx	Manually Scale X Axis – A horizontal dual-arrow cursor appears. The cursor lets the user manually adjust the X-axis by dragging the mouse.			
5]	Linear / Log Scale Y Axis – Spectrum Display Only. This button allows you to switch between Linear and Log Y-axis scaling. If you expand the data plot this feature is disabled until the plot is returned to its original scale via the Auto Scale button.			
6	00:01	Frequency Axis – Used to set the x-axis to Hz, CPM, or Orders. Applies to Spectrum Plot Windows only. Each click of the Frequency Axis button toggles the x-axis unit of measure.			
		Hz Orders CPM Orders			
7	8 /	Delta Time or Delta Record – For Stripcharts Only: Selects one of two X-axis spacing types.			
		With (a) When button (7) is gray, Delta Time is selected for the X-Axis. Delta Time spacing displays data with absolute time for the X-axis.			
		Stripcharts selected (b) When button (7) is green, Delta Record is selected for the X-Axis. Delta Record has X-axis time spacing based on record changes. Thus the time line on the X-axis is not uniform. Delta Record spacing is good when there are short acquisition durations over long periods of time as vacant time slots are eliminated from the display.			
		Skip Records or Use All Records – For Waterfalls Only: Selects one of two display modes.			
		(a) When button (7) is gray, "use all Records" is selected and the entire waterfall will scroll. Scrolling can With be forward or backward.			
		Waterfall selected (b) When button (7) is green a maximum of 100 records will be scrolled based on a Skip Record Factor. SRF = History Records / Waterfall Records - 1. Thus if we had 634 history records and 100 waterfall records we would have a skip factor of 6.4 records, i.e., 634 / 100-1 = 6.4 records. This skip factor would result in 100 records being scrolled. Note that the SRF is automatically calculated and applied by software.			
8	ti	Display Cursor Values – allows you to show a plot cursor with annotation. A cursor is provided with each plot trace. Cursors can be visible or hidden.			
9		Show Frame Annotation – Shows a framed set of information such as machine names, user notes, and spectral bands.			
10	₽ 123	Show RPM / Time Annotation - Active with Polar, Waterfall, and Shaft Centerline Plots. Use this button to superimpose RPM or Time values onto the displayed data.			

$3^{rd} \ Toolbar \ ({\it continued})$

1	Yx Y Lx]	
11	Îîr	Harmonic Cursors – Can only be used when 1 trace is displayed. Results in several cursors positioned to the right of the primary cursor and at intervals that are at twice the x-axis value of the primary cursor. For example: When the primary cursor is at 100 Hz, the first harmonic cursor will be at 200 Hz, the second at 400 Hz, the third at 600 Hz, etc. Moving the primary cursor to 400 Hz would result in the first harmonic cursor residing at 800 Hz, the second at 1200 Hz, etc. If Display Gauge Values is selected, the applicable values will be shown for all cursors. Harmonic cursors can only be moved by moving the primary cursor.
12	īĪ	Side Band Cursors – Can only be used when 1 trace is displayed. Results in several cursors spaced at even intervals on both sides of the primary cursor. Unlike the harmonic cursors, the sideband cursors can be moved by the user. Once adjusted, they remain in position at until the next adjustment. If Display Gauge Values is selected, the applicable values will be shown for all cursors.
13	11	Peak Cursors – Can only be used when 1 trace is displayed. The cursors will automatically position at the highest peaks on the trace.
14		Multiple Trace Cursor Locked - When locked, cursors for like plots are moved simultaneously. As you move cursors in one spectrum, the cursors in the other spectrum plots move to the same X position.
15	太太	<u>Unlocked</u> - When unlocked, you can only move the cursors in the plot that has focus. Cursor Update - Fixed X axis / Peak Search – When this button has a gray background, the x-axis is fixed and the cursor will not move when a new spectrum is plotted. When the button has a green background "Peak Search" is in effect and the cursor will automatically move to the highest point on the plot. The button is typically used for Spectrum plots, either Real Time or Historical Data.
16	لتسل	Overlay Limits – For Spectrum, Stripchart, and Polar plot windows. Superimposes the limit values onto the displayed data.
17	+	Runout Compensation – displays a graph of the RunOut compensated values for Bode and Polar plots. RunOut compensation is a vector math operation in which the referenced first-order amplitude and phase vector is subtracted from the displayed first order vector. For Time Waveform and Orbit plots this shows time waveform compensation.
18	<u>@</u>	Overlay Bearing Clearance Circle – For Orbit and Shaft Centerline this button is used to superimpose the bearing clearance circle over the plot display.
19	DC	Apply DC Coupling – For Bode, Stripchart, and Time Waveform this button is used to apply DC Coupling. Commonly used with Displacement Probes.
	لئد	-/+ Spectrum Full – Sets the x-axis to have both negative and positive on the scale.
20	at at	Double Differential – Changes the display by a double differential, for example, from Displacement to Accelerometer.
21	94	Single Differential – Changes the display by a single differential, for example, from Displacement to Velocity, or Velocity to Accelerometer.
22	5	Single Integration – Changes the display by a single integration, for example, from Velocity to Displacement, or from Accelerometer to Velocity.
23	<u>22</u>	Double Integration – Changes the display by a double integration, for example, from Accelerometer to Displacement.
24	5 Revs 🔻	Shaft Revolution Filter — Used with Time and Orbit plots. This filter selection is used to limit the amount of data displayed. The limitation is set by selecting "n," where "n" is equal to the number of shaft revolutions. The Shaft Revolution Filter is used to make the plot display cleaner by reducing clutter from excess data. Selection options are: N/A, 1 rev, 2 revs, 5 revs, and 10 revs.
25	=	Show User Notes – Displays the User Notes from the Project Information window. The notes are displayed in a free-moving, re-sizeable box. You can enter text in this field.

6-3

This chapter provides examples of the various plot types. The following chapters are directly related to this one and may need reviewed or referred to.



Chapter 5, Display Menu... Plot Windows, discusses:

- o how to save and recall plot setups
- o change display ranges
- o change scales
- o Real Time and History Data (playback) modes
- o channels
- o filtering data



Chapter 6, *Toolbar Buttons*, identifies the layout of the toolbars and explains the purpose of each button.

Selecting Plots from the Display pull-down menu opens a *Data Display window*. Note that you can double-click on a gauge to open a Data Display window for plotting the data for that gauge.

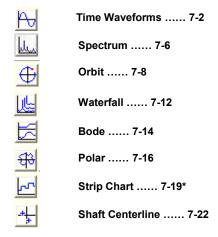
For real-time displays, you can halt and resume the display of data by using the Pause/Continue toggle button, or use the "P" key on the keyboard. When viewing historical data, you can use the playback buttons and the history data slider to navigate through the data.

You can view either real-time data or historical data. In the examples that follow we are viewing historical data, thus the History button has been clicked, and appears "active" [green] on our screen.

Prior to viewing a plot you need to:

- select the channels to be displayed
- select the desired data display format, e.g., Time Display, Spectrum, or Waterfall
- select the data source, i.e., a "Real Time" source, or a history data file

The examples in this chapter consist of the following:



eZ-TOMAS & eZ-TOMAS Remote 887491 Display Menu ... Plots Plot Examples 7-1

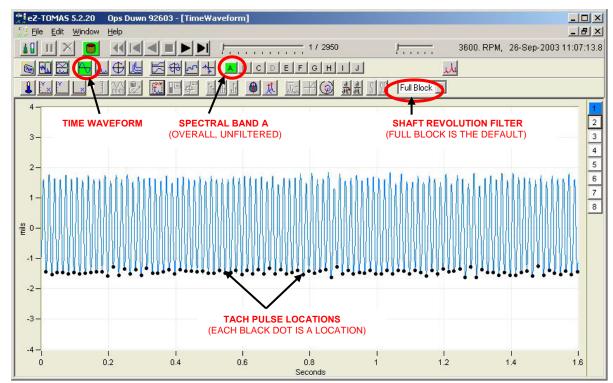
^{*}Note for IOtech 655 Users: Use the Strip Chart for meaningful temperature plots.

Time Waveform Displays

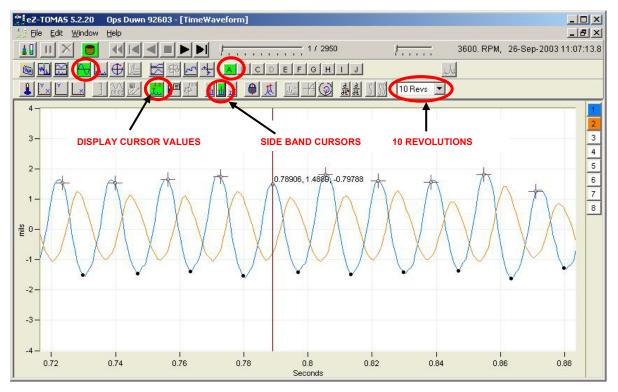


Time Waveform displays show vibration amplitude as a function of time (seconds) for a block of time domain data. This Block is the measured data used in Spectral Displays. Note that multiple channels can be shown on the Time Display.

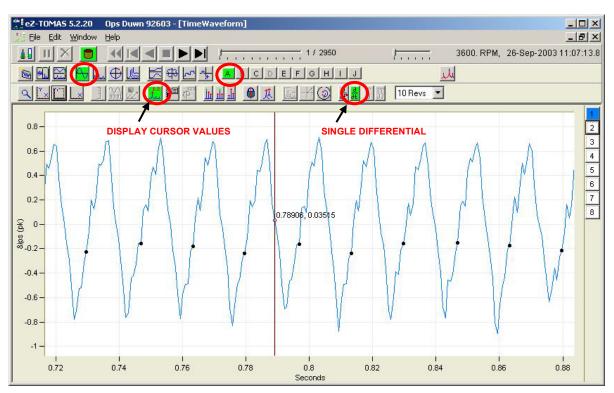
Tach Pulse locations are shown with a black dot.



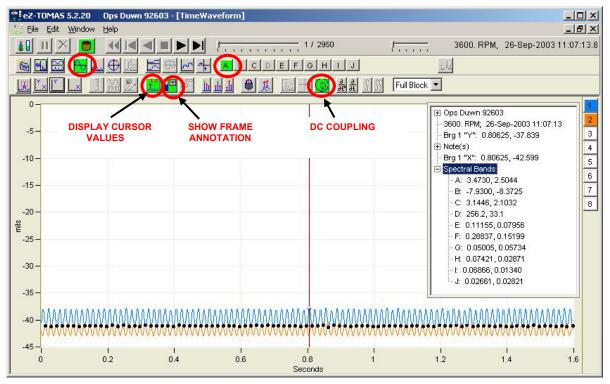
Time Waveform, Fig. 1 - Unfiltered, Channel 1, Full Time Block, No Cursors



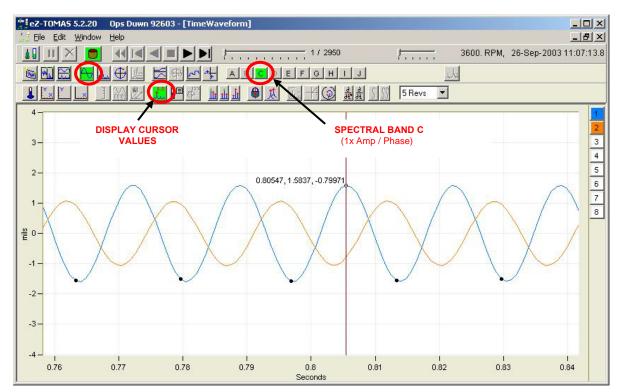
Time Waveform, Fig. 2 - Unfiltered, Channels 1 and 2, 10 Revolutions, Cursor plus Sidebands



Time Waveform, Fig. 3 - Unfiltered, Channel 1, 10 Revolutions, Cursor, Single Differential



Time Waveform, Fig. 4 - Unfiltered, Channels 1 and 2, Full Block, Cursor with Frame Annotation, DC Coupling



Time Waveform, Fig. 5 - Filtered 1x, Channels 1 & 2, 5 Revolutions, Cursor

Time Waveform Compensation (selectable option)

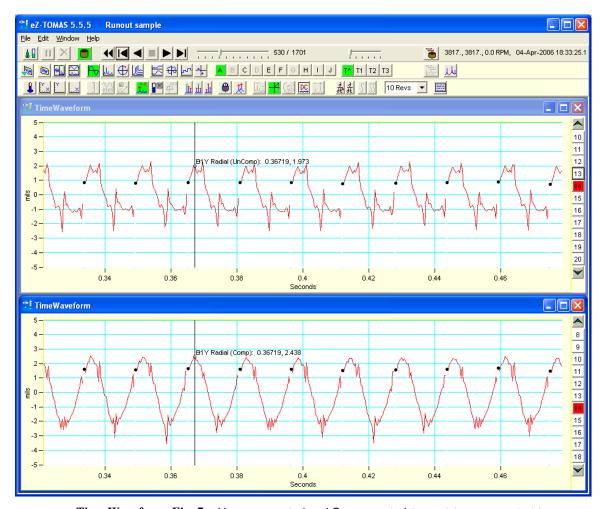
As an option, you can display compensated Time Waveforms. Typically this compensation function is used to remove shaft runout from the data display.

To use this feature:

- (a) view the history data
- (b) select the slow roll condition
- (c) select: File
- (d) select: Export
- (e) select: Runout

You can now view data at steady state and select Runout Compensation.

The following example, using channel 14, shows *Uncompensated* and *Compensated* plots.

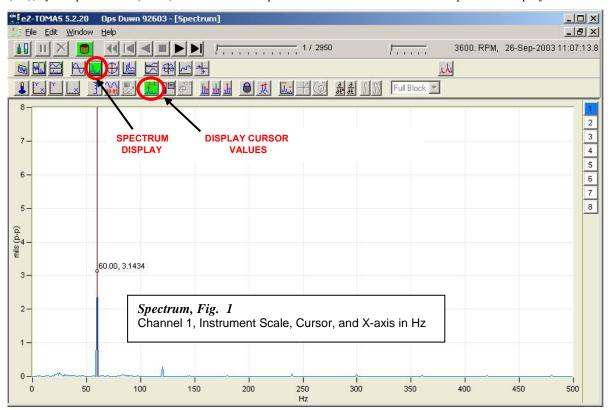


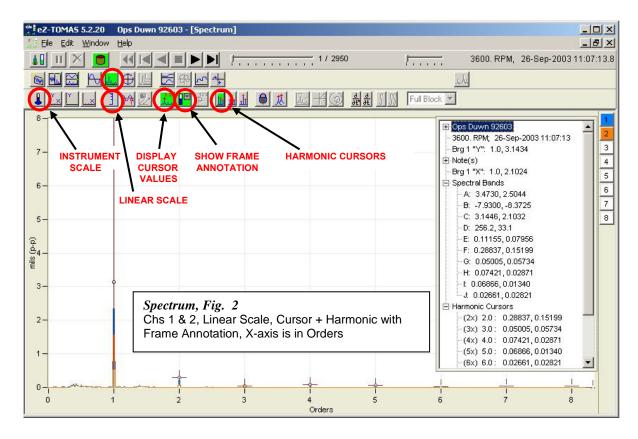
Time Waveform, Fig. 7 - Uncompensated and Compensated (upper & lower respectively)

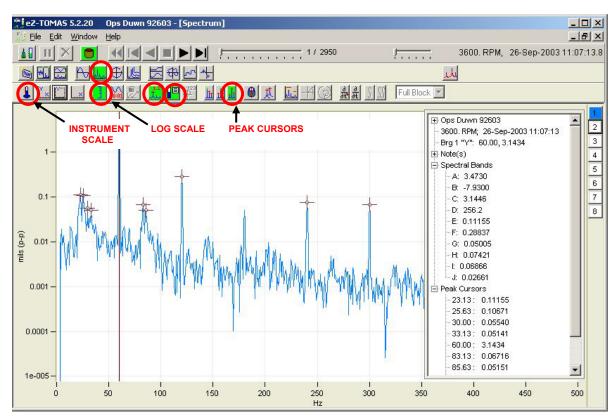
Spectrum Displays



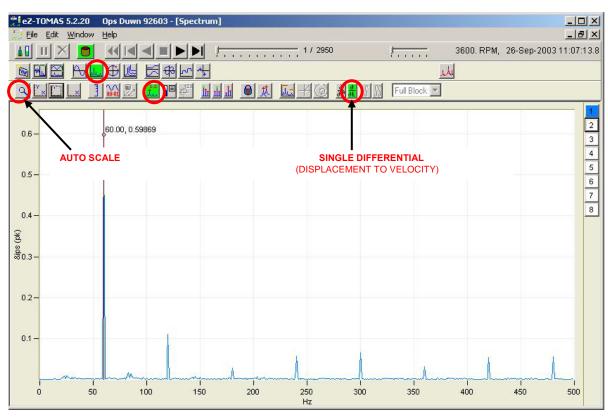
Spectrum Displays show vibration amplitude as a function of frequency. The frequency units can be either Hertz (Hz), cycles per minute (CPM) or orders. Multiple channels can be shown on the Spectrum Display.







Spectrum, Fig. 3 - Channel 1, Log Scale, Cursor plus Peaks with Frame Annotation, X-axis is in Hz



Spectrum, Fig. 4 - Ch 1, Auto Scale, Cursor, X-axis is in Hz, Single Differential (Displacement to Velocity)

Orbit Displays



Orbit Displays show simultaneous time domain vibration amplitude for an X and Y probe pair.

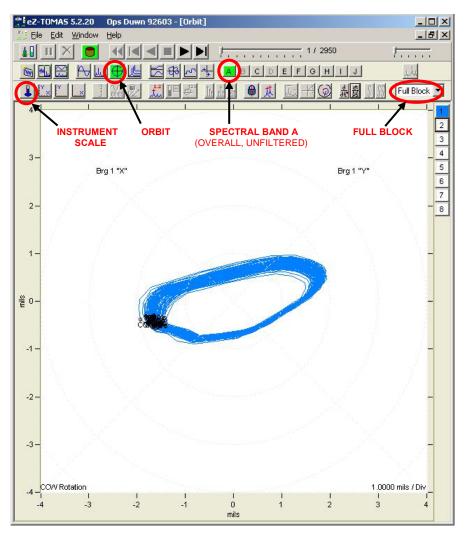
The location of each Tach pulse is shown on the orbit plot using black circles; and a rotation direction label ("CCW" or "CW") is shown next to these (see figure).

The default display is "Full Block" of time data. However, a specific number of Shaft Revolutions can be displayed (1, 2, 5, or 10) by using the associated pull-down list (see figure). The orbit display is corrected for probe location.

You can optionally overlay the orbit onto a shaft center line display by clicking the **Shaft Centerline** button. The center of the orbit trace in SCL computes the difference between the current gap voltage and the reference gap voltage. Information regarding shaft centerline plots is presented on page 7-20.

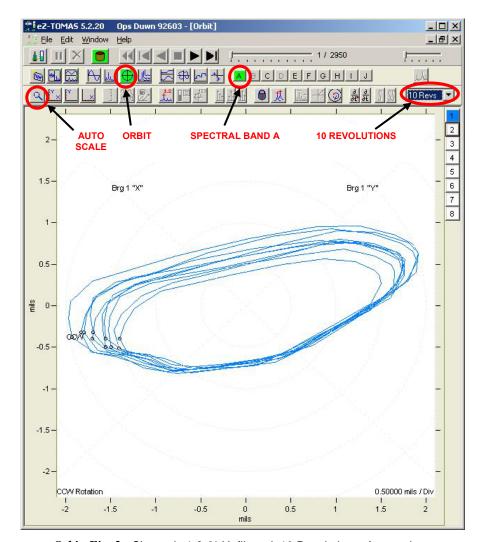
To display an overlay of the bearing circle clearance, as indicated below (third plot), click the <Overlay Bearing Clearance Circle> button (see figure).

Note: Only one probe pair can be shown on the Orbit Display.



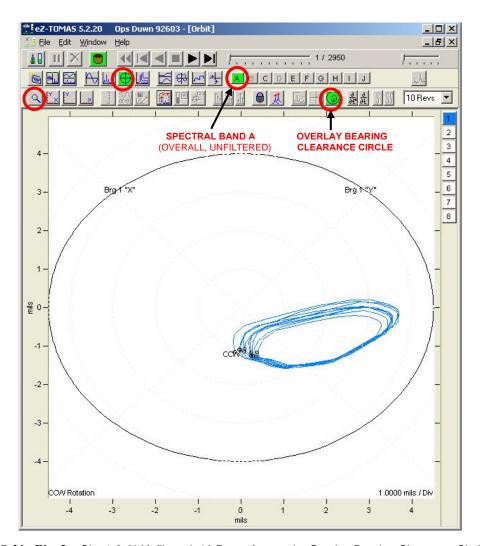
Orbit, Fig. 1 - Channels 1 & 2* Unfiltered, Full Block, Instrument Scale

^{*}Channel 2 Pairing is from the Setup Configuration Window, Input Channels Tab, XY Pair Column



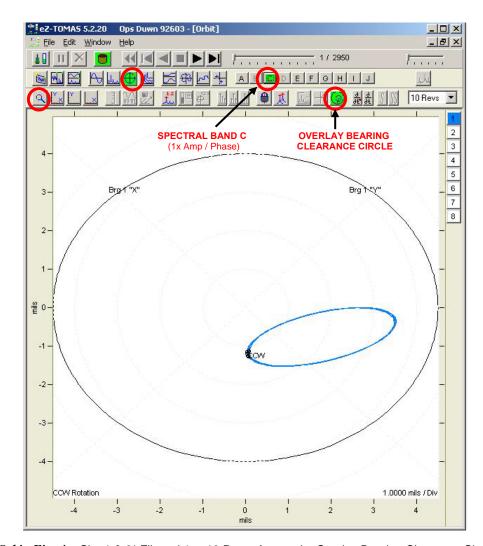
Orbit, Fig. 2 - Channels 1 & 2* Unfiltered, 10 Revolutions, Autoscale

^{*}Channel 2 Pairing is from the Setup Configuration Window, Input Channels Tab, XY Pair Column



Orbit, Fig. 3 - Chs 1 & 2* Unfiltered, 10 Revs, Autoscale, Overlay Bearing Clearance Circle

^{*}Channel 2 Pairing is from the Setup Configuration Window, Input Channels Tab, XY Pair Column



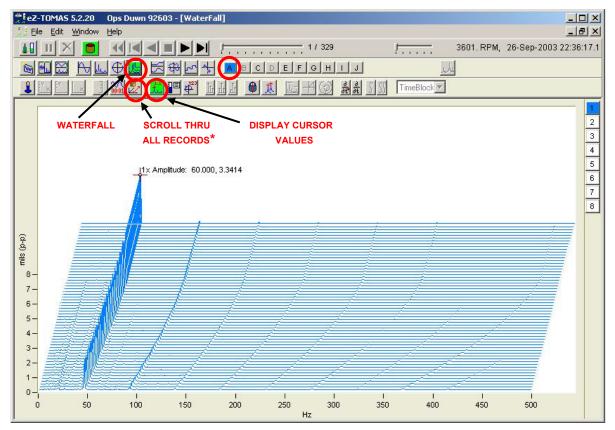
Orbit, Fig. 4 - Chs 1 & 2* Filtered 1x, 10 Revs, Autoscale, Overlay Bearing Clearance Circle

^{*}Channel 2 Pairing is from the Setup Configuration Window, Input Channels Tab, XY Pair Column



Waterfall Displays

Waterfall Displays show a series of Spectrums on a 3D graph. The X-axis is Frequency either Hz or CPM. The Y Axis is Vibration Amplitude. And the Z Axis is time. Three examples follow.



Waterfall, Fig. 1 - Channel 1, Scrolling Buffer, Cursor

To adjust the <u>Latitude Angle (Vertical Pitch)</u> of the Waterfall display, Right Click in the Y-axis area and enter a value between 0 and +75 degrees. This is indicated in the upper left corner of the display (see figure). Unless you right-click in the Y-axis region, this feature will remain hidden.

To adjust the <u>Longitude Angle (Horizontal Pitch)</u> of the Waterfall display, Right Click in the X-axis area and enter a value between -75 and +75 degrees. This is indicated in the lower right corner of the display (see figure). Unless you right-click in the X-axis region, this feature will remain hidden.

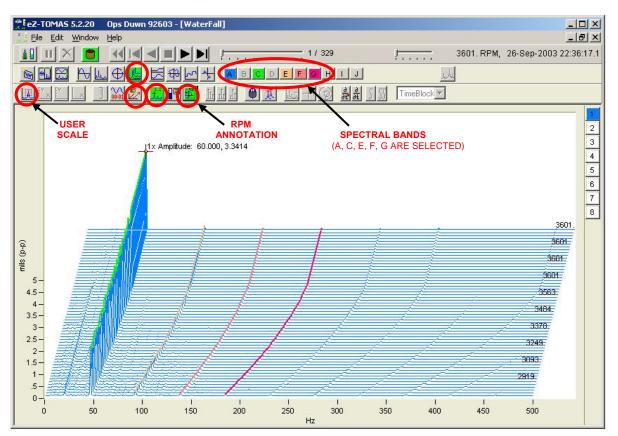
*Note:



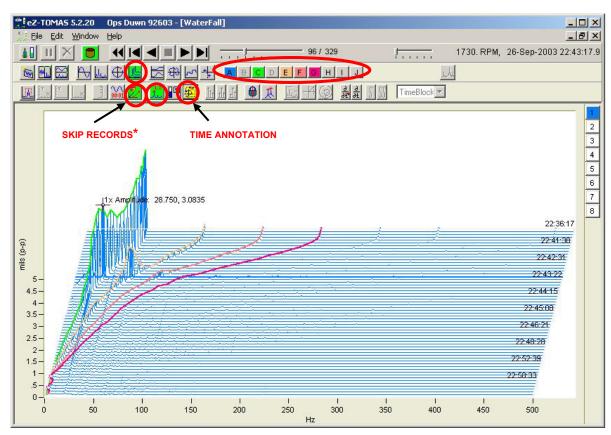
Use All Records or Skip Records – When Waterfall is selected this button determines which one of two display modes will be in effect.

- Show Entire Range (Use All Records): When the button is gray, as indicated above, "Use all Records" is selected and the entire Waterfall will scroll. Scrolling can be forward or backward.
- O **Skip History Record**: When the button is green a maximum of 100 records will be scrolled based on a **Skip Record Factor**. SRF = History Records / Waterfall Records 1. Thus if we had 634 history records and 100 waterfall records we would have a skip factor of 6.4 records, i.e., 634 / 100-1 = 6.4 records. This skip factor would result in 100 records being scrolled. Note that the SRF is automatically calculated and applied by software.

Waterfall Figure 3 is an example of Skip History Record.



Waterfall, Fig. 2 - Ch 1, Scrolling Buffer, Cursor, Overlay 1xA & 2xA & 3xA & 4xA, RPM Annotation



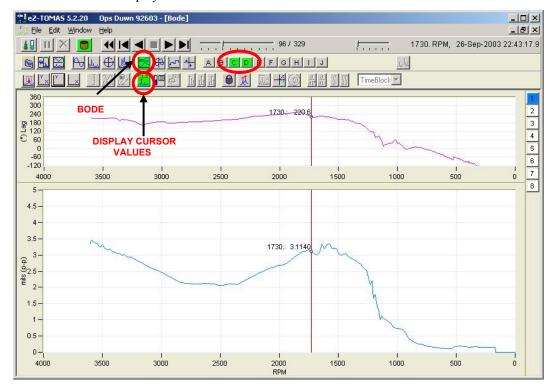
Waterfall, Fig. 3 - Ch1, Skip Records Fill Buffer, Cursor, Overlay 1xA & 2xA & 3xA & 4xA, Time Annotation * In regard to "Skip Records," see Waterfall Figure 1 and the associated note page 7-11.

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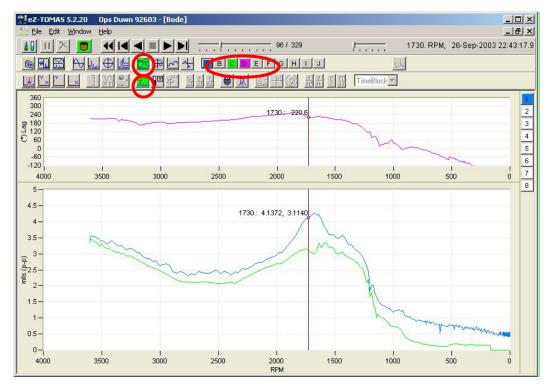
Bode Displays



Bode Displays show vibration amplitude and phase as a function of rotating speed. You can display the runout compensation values on the same plot by clicking the <Runout Compensation> button (see Bode, Figure 3). Runout Compensation is a vector math operation, in which the referenced first order amplitude and phase vector is subtracted from the displayed first order vector.

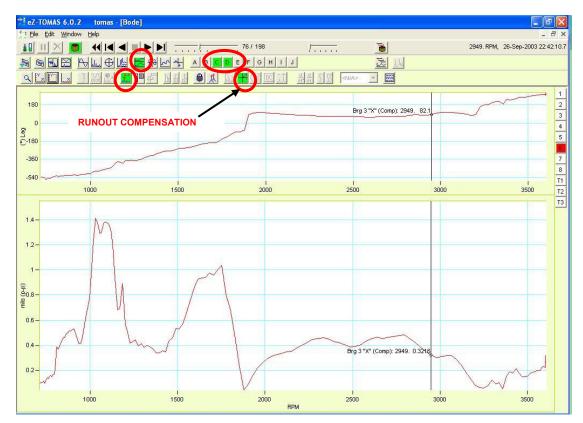


Bode, Fig. 1 - Channel 1, 1xA & 1xP, Cursor



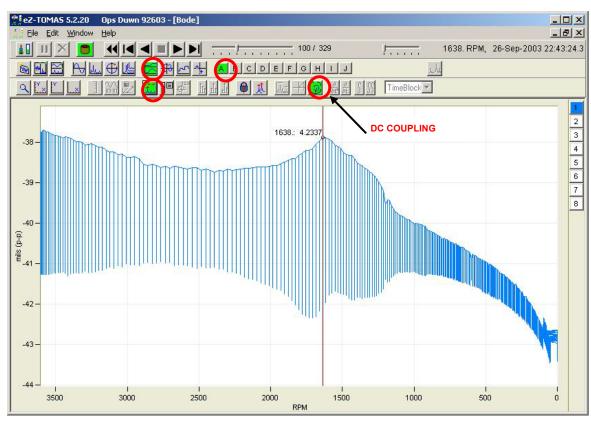
Bode, Fig. 2 - Channel 1, Overall & 1xA & 1xP, Cursor

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Bode, Fig. 3 - Channel 6, 1xA & 1xP, Cursor

You can view displays as either Compensated or Uncompensated. When Runout Compensation is selected, a single "Compensated" trace is displayed.



Bode, Fig. 4 - Channel 1, Overall, DC Coupling Applied, Cursor

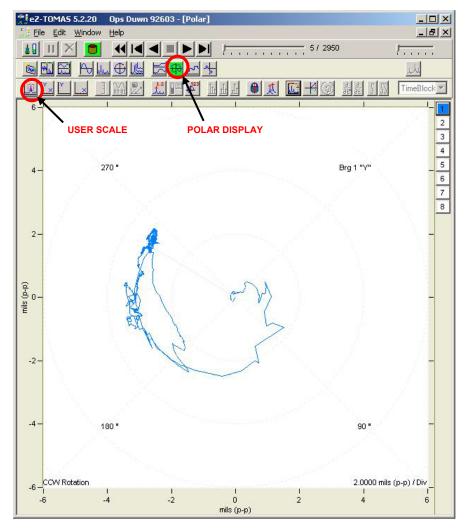
Polar Displays



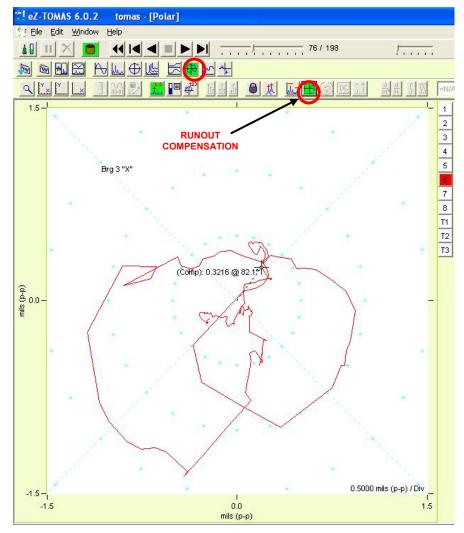
Polar Displays show vibration amplitude and phase lag on a polar plot format. The data is corrected for probe location. Phase lag is opposite the direction of rotation. You can optionally display the "Runout" compensated values by clicking the associated button (see figure). The compensation values are specified for each channel in the setup configuration.

Runout Compensation is a vector math operation, in which the referenced first order amplitude and phase vector is subtracted from the displayed first order vector.

Note: Only one channel can be shown on a Polar Display.

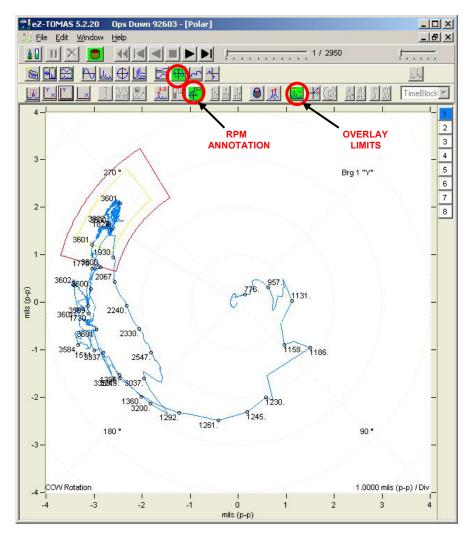


Polar, Fig. 1 - Channel 1, User Scaled



Polar, Fig. 2 - Channel 6, Runout Compensation

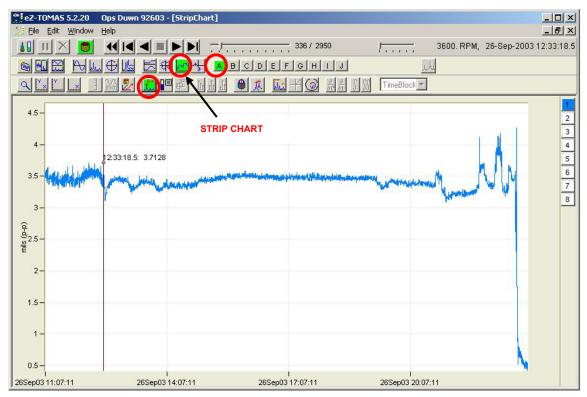
You can view displays as either Compensated or Uncompensated. When Runout Compensation is selected, a single "Compensated" trace is displayed.



Polar, Fig. 3 - Channel 1, Limit Region Overlay, RPM Annotation

Strip Chart Displays

Strip Chart Displays show selected instrument gauge values as a function of date and time. Five examples follow.

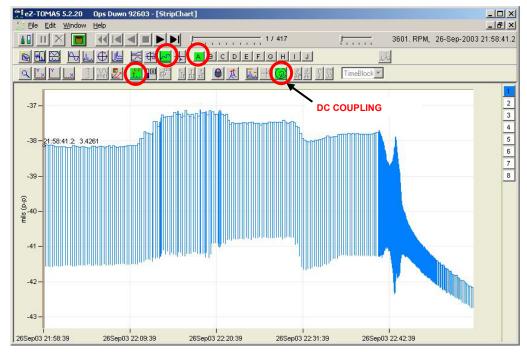


Strip Chart, Fig. 1 - Channel 1, Overall, Cursor

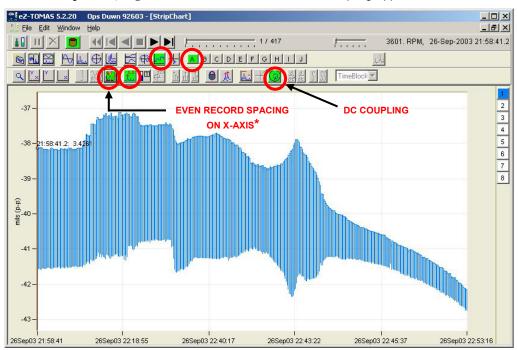


Strip Chart, Fig. 2 - Channel 1, Overall & 1xA & 2xA, Cursor with Frame Annotation

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Strip Chart, Fig. 3 - Channel 1, Overall with DC Coupling Applied, Cursor



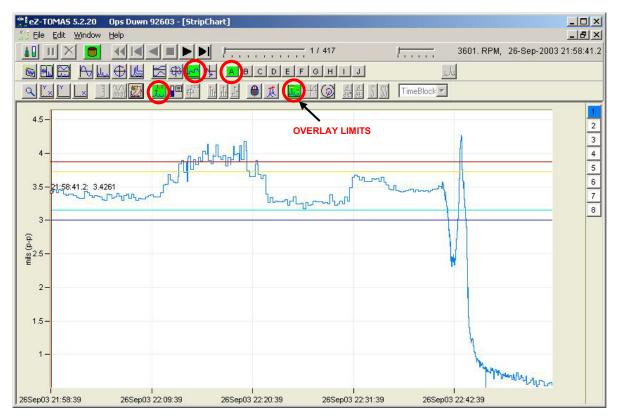
Strip Chart, Fig. 4 - Ch 1, Overall with DC Coupling Applied, Even Record Spacing on X-axis, Cursor

*Note: Delta Time or Delta Record – When this button is used with Strip Charts, one of the two following modes will be effect. Each pertains to X-axis spacing.



- (a) When the button is gray (as in the upper plot display), Delta Time is selected for the X-Axis. **Delta Time** spacing displays data with absolute time for the X-axis.
- (b) When the button is green (as in the lower plot display), Delta Record is selected for the X-Axis. **Delta Record** has X-axis time spacing based on record changes. Thus the time line on the X-axis is not uniform. Delta Record spacing is good when there are short acquisition durations over long periods of time as vacant time slots are eliminated from the display.
- (c) A feature of the strip charts is that, DC coupling changes the strip chart format to represent +/- overall value. The width of the bars represents the density of measurements. Note the difference in figures 3 and 4.

eZ-TOMAS & eZ-TOMAS Remote 887491 Display Menu ... Plots Plot Examples 7-20



Strip Chart, Fig. 5 - Channel 1, Overall, Limit Values Overlayed, Cursor

Shaft Center Line (SCL)

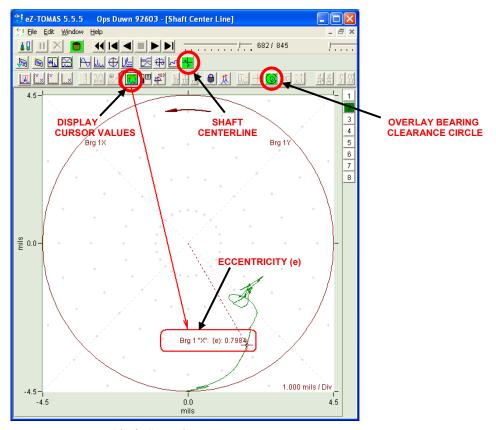


Shaft Centerline (SCL) is used to display the change in gap voltage for a Channel Pair. SCL is typically used in conjunction with Displacement Probes.



In order to get valid SCL displays the input channels must be DC coupled.

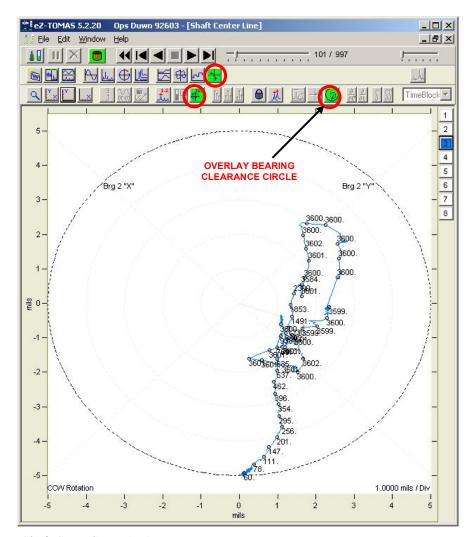
The measured DC Gap Voltage is corrected to the Gap Reference Value and Shaft Starting Location (Brg Start), which are set in the Edit pull-down menu's Setup Configuration window, in the Input Channels tab.



Shaft Centerline, Fig. 1

Note: Eccentricity "(e)" is computed and displayed as a cursor value for Shaft Centerline plots. Eccentricity is the ratio of current gap to the bearing clearance.

eZ-TOMAS & eZ-TOMAS Remote 887491 Display Menu ... Plots Plot Examples 7-22



Shaft Centerline, Fig. 2 - Ch 3 & 4*, Bearing Clearance Circle, RPM Annotation

^{*}Channel 4 Pairing is from the Setup Configuration Window, Input Channels Tab, XY Pair Column

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Snapshot Log 8-6

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Configuration Setup [.txt File] 8-8



Display Pull-Down Menu

eZ-TOMAS can generate the following types of logs and reports: Statistical, Alarm, Snapshot, Production Test, and Configuration Setup text file (.txt).

Note 1: Plot Windows, which can also be selected from the Display pull-down menu, are discussed in Chapters 5, 6, and 7.

Statistical Report

The Statistical Report lists the historical spectral band data. It includes the instrument, the engineering units, the minimum value, the mean average value, the maximum value, and the standard deviation by channel.

The Statistical Report can be accessed from the Gauge Window's Reports Pull-down menu.



Statistical Report

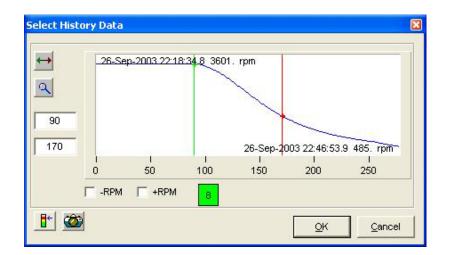
The report can be saved as an ASCII text file for further use.

This data can be used to generate or fine tune limits. Note that you can have eZ-TOMAS automatically compute limit values by selecting *Generate Limits* on the File menu. You can view and modify limits by selecting Limits in the Gauge Window's Edit pull-down menu. Chapter 2 contains additional information.

Accessing a Statistical Report

To obtain a Statistical Report you need to specify the time period that the report is to cover. This is accomplished as follows:

1. From the Gauge Window's Display pull-down menu, select Statistical. The Select History Data window will open (see following figure).



Select History Data Window

- 2. Select the start and end points to define the period the report is to cover. You can do this by entering record numbers in the numeric fields at the left, or by dragging the green and red bands. Page 2-4 of this manual contains detailed instructions.
- 3. Click the **<OK>** button to display the report.
- 4. To save the Statistical Report as an ASCII text file, select *Save the Report* from the Statistical Report's File pull-down menu (see following figure).



The Statistical Report's File Pull-down Menu

With options to "Save the Report" and to "Generate Limits"

Statistical reports can be used to automatically generate limit values based on historical data. If your monitored machine has been operating at a steady state condition and if you have stored data at this condition, then eZ-TOMAS can use this data to determine limit values based on the average and variance of the data. However, you probably will want to edit these limits if the machine is experiencing amplitude or frequency shifts.

Using a Statistical Report to Generate Limits

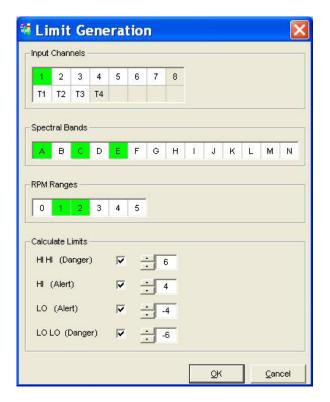
Statistical reports can be used to automatically generate limit values based on history data. If you have acquired and stored data at a steady state machine condition Tomas can calculate limits for you based on the Average and Variance of the data.

- 1. On the **Display** pull-down menu select **Statistical**; the History Data window will open.
- 2. Drag the top slide pointer across the time scale to select the Start Date and Time for the report.
- 3. Drag the lower slide pointer across the time scale to select the End Date and Time for the report.
- 4. Click the **OK**> button. The Statistical Report will be displayed.
- 5. Open the **File** menu (in the Statistical Reports window).
- 6. Select "Generate Limits." The Limit Generation dialog box will appear (see following figure).
- 7. Use the checkboxes, as applicable, to select: (a) the **Input Channels** for which you want Limit Calculations performed, (b) the **Spectral Bands** for which limits should be generated, (c) the **RPM Ranges**, if applicable, (d) the Standard Deviation to be used for **HI HI (Danger)**, **HI (Alert)**, **LO (Alert)**, and **LO LO (Danger)**. (See following figure).



Limit values are not used if:

- (a) the 'HiHi limit value' minus the 'LoLo limit value' is less than 5% of the instrument scale, or
- (b) the limit value is outside of the instrument range.



Limit Generation

- 8. Click the **<OK>** button. A prompt will appear, asking if you want to Save New Limits.
- 9. Click <Yes>.

Alarm Log

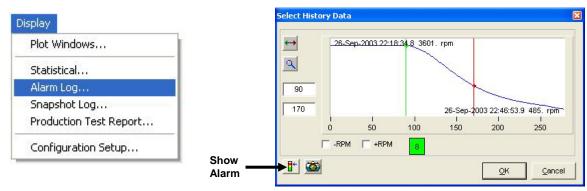
eZ-TOMAS triggers data storage based on Alarm Events. Whenever an alarm occurs, the program automatically stores the following Time Blocks for all Input Channels:

- o One Time Block prior to the Alarm Event
- o The Time Block which the Alarm Event occurred in
- o "N" Time Blocks after the Alarm Event

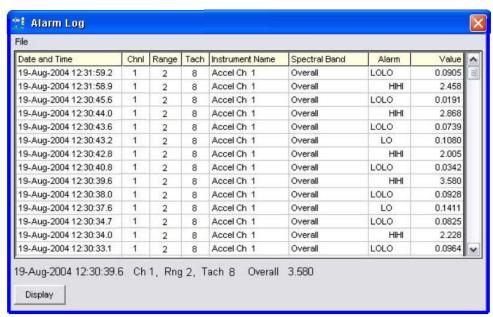
From the Alarm Log you can select an event of interest, then click the <Display> button to display data from the event, the preceding time block, and a specified number of blocks following the event.

The Alarm Log (following figure) includes the date and time, the channel number, reference tachometer, instrument name, spectral band type, alarm type, and value of the alarm signal.

You can access the Alarm Log from the Gauge Window's Display pull-down menu, or by clicking the **Show Alarm Log>** button [located in the History Data File window].



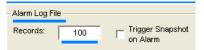
Two Ways to Access the Show Alarm Log



Alarm Log

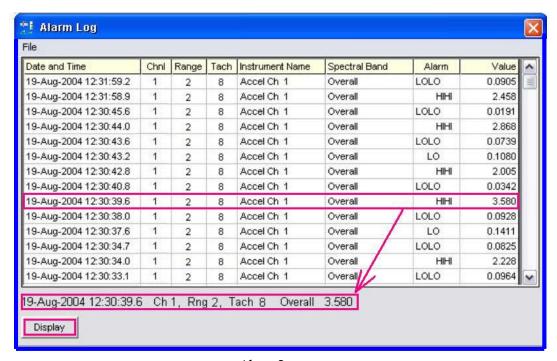
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The Alarm Log contains the last "N" number of alarm events, where "N" is the number of Records specified in the Limit Configuration window. In the following figure the number of records has been set to "100."



Alarm Log File Records in the Limit Configuration Window

In the visible portion of the following Alarm Log we see that the LoLo alarm state occurred 7 times, the Lo alarm state 2 times, and the HI HI alarm state 5 times.



Alarm Log

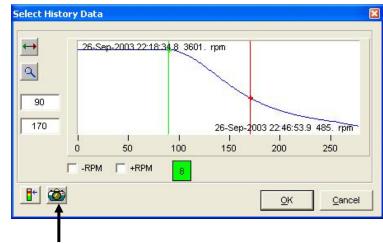
Note: From the Alarm Log you can select an alarm event then click the <Display> button to display data from that alarm event. You can also display the data by *double-clicking* on the desired alarm event

To save the Alarm Log select "Save the Report" from the window's File Menu. The log is saved as a TXT file associated with the TOMAS project. Notepad is automatically activated to show the Alarm log.

Snapshot Log



Selecting Snapshot Log from the Display Menu



Selecting Snapshot Log from the 'Select History Data Dialog Box'

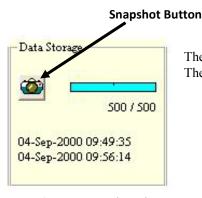


The Snapshot Log can be accessed from the Gauge Window's Display pull-down menu, and also from the Select History Data dialog box.

The Snapshot Log contains entries which were created whenever the user clicked the **Snapshot** button located on the main window (gauge window). See figure at lower left of this page.

In the figure at the right, the log contains three snapshot entries.

The two buttons (Selecting Snapshot Log and Snapshot) should not be confused, as one (on the Select History Data dialog) opens the Snapshot Log and the other (on the main window) takes the snapshot, i.e., captures data to be stored in log.



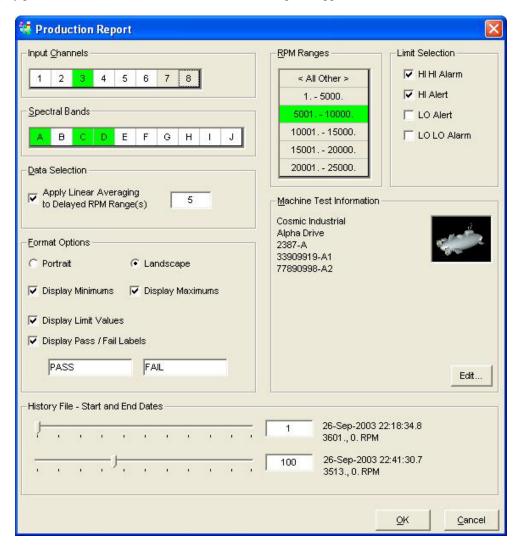
Data Storage Panel on the Main Window

The **Snapshot** button captures "N" seconds of continuous data.

The captured data is stored in the **Snapshot Log**.

Production Test Report . . .

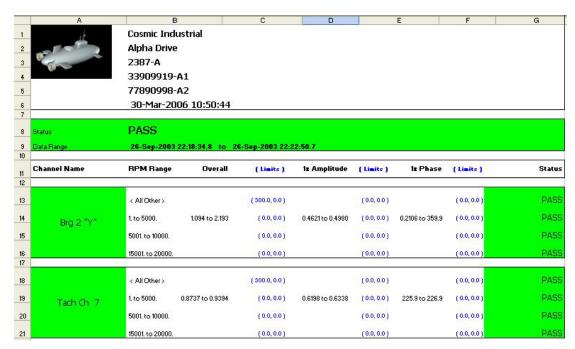
You can use eZ-TOMAS to create a Production Test Report. When the feature is selected from the Display pull-down menu, a screen similar to the following will appear.



Configuring a Production Report

Reports are created using your custom settings. Among the options available you have your choice of:

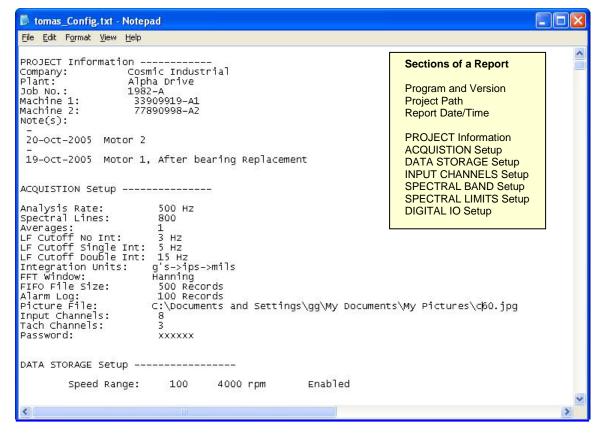
- Input Channels
- RPM Ranges
- Spectral Bands
- Start and End Dates in the History File
- Format Options: including Portrait or Landscape, Displaying Minimum and/or Maximum values, display Pass and Fail labels (for example, you could have "Schedule Maintenance" as a label.
- Machine Test Information (from the Project Information dialog box)



Example of a Production Test Report

Configuration Setup [.txt File]

Selecting "Configuration Setup" from the Reports pull-down menu creates a text file that contains configuration details of the current project. The printed text file provides a backup of the project's configuration.



The Beginning of a Setup Configuration .txt File



Security Pull-Down Menu

eZ-TOMAS has three Security Levels. Note that these levels have no impact on eZ-TOMAS Remote.

- User Level 1 allows users to View Gauge data in the Main menu and Print.
- User Level 2 Level 2 operators cannot start or initialize a project, erase the History file, edit the configuration, or change the security password..
- User Level 3 has full privileges, which include the ability to start new projects and erase History files. Level 3 is password protected.

After selecting User Level 3, a dialogue box similar to the following will appear. The user must enter the project's Level 3 password to enable full privileges.



Change User Level Dialog Box

No password is required to go from Level 3 down to Level 2 or to Level 1. However, the project password is required to move from Level 1, or Level 2, to a higher level.

The "Change Password" command, in the Security pull-down menu, opens the *Change Project Password* dialog box (see following figure). This dialog box will only be visible when the user selects the "Change Password." option. Note that you can only access the *Change Project Password* box from User Level 3.



Changing Project Password Dialog Box

To change the password:

- 1. Open the Security pull-down menu.
- 2. Select "Change Password." Note that you can only do this from User Level 3. The Change Project Password dialog box will open.
- 3. Type the desired password in the field below "Enter Level 3 Password."
- 4. Re-enter the password in the "confirm" text box.
- 5. Press the **OK** button.

If the confirmed password was entered correctly the new password will be in effect.

```
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    Configuring the Windows Firewall ..... 10-3
    Configuring DCOM Machine Default ..... 10-4
    Configuring DCOM for an Individual OPC Server ..... 10-5
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    Accessing the OPC Configuration Dialog ..... 10-7
    Understanding the OPC Interface ..... 10-7
    OPC Status on the eZ-TOMAS and eZ-TOMAS Remote Main Windows..... 10-10
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```

What is OPC?

OPC stands for "OLE for Process Control," where OLE is Object Linking and Embedding. OPC is a series of specifications which are designed to support the ability for components of industrial automation systems to communicate with each other. eZ-TOMAS OPC functionality is in accordance with the OPC Data Access (OPC-DA) specification, which describes the ability to move process data between PLCs, DCSs, HMIs and other clients. More information on OPC can be found at http://www.opcfoundation.org.

eZ-TOMAS can act as an OPC server to publish its gauge data items as OPC tags. OPC clients can connect to the server to obtain data acquisition values as they are being produced by eZ-TOMAS.

eZ-TOMAS OPC Support

eZ-TOMAS OPC Support provides the ability to:

Publish gauge data as OPC tags

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- Set OPC process name
- Set OPC tag names
- Enable/disable OPC server update during acquisition
- Monitor OPC status (via icons) in eZ-TOMAS as well as eZ-TOMAS Remote

Installing eZ-TOMAS OPC Support

The software installation instructions for **eZ-TOMAS** and **eZ-TOMAS OPC Support** are located on page 1-2 of this manual. You can access that page by clicking here.

Setting up eZ-TOMAS as an OPC Server

Installing eZ-TOMAS OPC support does not modify security permissions on your computer. To make the OPC server visible on your network, certain security parameters with respect to Distributed COM (DCOM) must be modified.

An OPC Foundation document is available which outlines the issues and the steps necessary to take to make an OPC Server visible to clients on the network. This document may be obtained at:

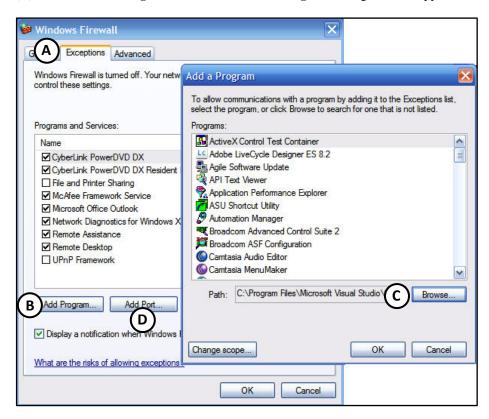
http://www.opcfoundation.org >> Downloads >> White Papers >> Using OPC via DCOM with Windows...

Note: The OPC document (referenced above) covers the following topics and steps. In this IOtech document the steps have been fine-tuned for eZ-TOMAS OPC Support.

Configuring the Windows Firewall

The Microsoft Windows firewall is set to 'On' by default, and is recommended by both Microsoft and the OPC Foundation. For troubleshooting you may want to temporarily turn off the Windows firewall to see if it is a source of communication failure. If your machine is protected by a corporate firewall, the Windows firewall will likely not be used and thus be turned off, in which case the following steps need not be performed.

- From the Windows Desktop, navigate as follows:
 Start>>Control Panel>>Windows Firewall
 The Windows Firewall dialog box will appear.
- 2. In the Windows Firewall dialog box:
 - (A) Click the Windows Firewall **Exceptions** tab.
 - (B) Click the **Add Program** button. The **Add a Program** dialog box will appear.



(C) In the **Add a Program** dialog box, click the **Browse** button and locate and add the following three programs (executables).

Program Name	Source Location	
tagsrv.exe	Program Files >> National Instruments >> Shared >> Tagger	
Microsoft Management Console (mmc.exe)	Windows\System32	
OPC Utility (Opcenum.exe)	Windows\System32	

(D) After adding the three programs, click the **Add Port** button in the Windows Firewall **Exceptions** tab.

In the following steps we will be adding TCP port 135. This port is needed to initiate DCOM communications and allow for incoming echo requests.

10-3

- 3. In the **Add a Port** dialog box, enter **DCOM** for the Name, **135** for the Port number, and select the **TCP** radio button.
- 4. Click the **OK** button.
- 5. In the **Add a Port** dialog box, enter **DCOM2** for the Name, **135** for the Port number, and select the **UDP** radio button.
- 6. Click the **OK** button.

Configuring DCOM Machine Default

These steps are performed to configure the machine default settings for OPC Communications using Windows XP Service Pack 2 or Windows Vista.

- 1. On the Windows Desktop go to **Start >> Run**, type **DCOMCnfg**, then click **OK**.
- 2. Click on Component Services (under Console Root)
- 3. Double-click on **Computers** (under Component Services)
- 4. Right-click on **My Computer** and select **Properties**. The **My Computer Properties** dialog will appear.
- 5. Click on the **COM Security** tab.
- 6. In the **Access Permissions** panel:
 - (a) Click **Edit Limits.** The **Access Permission** dialog box will appear.
 - (b) In the dialog box, select **ANONYMOUS LOGON**
 - (c) Set all checkboxes to **Allow**.
 - (d) Click **OK** to exit the dialog.

The My Computer Properties dialog will appear with the COM Security tab active.

- 7. In the **Launch and Activation Permissions** panel:
 - (a) Click Edit Limits. The Launch Permission dialog box will appear.
 - (b) In the dialog box, select **Everyone**.
 - (c) Set all checkboxes to **Allow**.
 - (d) Click **OK** to exit the dialog.

The My Computer Properties dialog will appear with the COM Security tab active.

- 8. In the **Launch and Activation Permissions** panel:
 - (a) Click **Edit Default.** The **Launch Permission** dialog box will appear.
 - (b) In the dialog box, click the **Add** button. The **Select Users or Groups** dialog will appear.
 - (c) In the text box that states, "Enter the object names to select (examples):" enter the name, **Everyone**.
 - (d) Click the OK button. The Launch Permission dialog will appear with Everyone highlighted.
 - (e) Set all checkboxes to **Allow**.
 - (f) Click **OK** to exit the dialog.
 - The My Computer Properties dialog will appear with the COM Security tab active.
 - (g) Click **OK**. The **Component Services** dialog will appear.
 - (h) Exit the Component Services dialog.

Configuring DCOM for an Individual OPC Server

These steps are performed to configure DCOM for a specific COM server for OPC Communications using Windows XP Service Pack 2 or Windows Vista.

- 1. On the Windows Desktop go to **Start >> Run**, type **DCOMCnfg**, then click **OK**.
- 2. Click on **Component Services** (under Console Root)
- 3. Double-click on **Computers** (under Component Services)
- 4. Double-click on My Computer.
- 5. Double-click **DCOM Config**.
- 6. Right-click on the National Instruments Variable Engine.
- 7. Click Properties. The National Instruments Variable Engine Properties dialog opens.
- 8. Click on the **Security** tab.
- 9. In the Launch and Activation Permissions panel, select Customize.
- 10. Click the **Edit** button.
- 11. If the name **Everyone** is not in the **Group or user's names** list, perform steps 11.a through 11.d (otherwise skip directly to step 11.d).
 - (a) Click the **Add** button. The **Select Users or Groups** dialog will appear.
 - (b) In the text box that states, "Enter the object names to select (examples):" enter the name, **Everyone**.
 - (c) Click the **OK** button. The **Launch Permission** dialog will appear with **Everyone** highlighted.
 - (d) Set all checkboxes to Allow.
- 12. Click **OK** to exit the dialog and return to the **National Instruments Variable Engine Properties** dialog.
- 13. In the **Access Permissions** panel, select **Customize**.
- 14. Click the **Edit** button.
- 15. If the name **Everyone** is not in the **Group or user's names** list, perform steps 15.a through 15.d (otherwise skip directly to step 15.d).
 - (a) Click the **Add** button. The **Select Users or Groups** dialog will appear.
 - (b) In the text box that states, "Enter the object names to select (examples):" enter the name, **Everyone**.
 - (c) Click the **OK** button. The **Access Permission** dialog will appear with **Everyone** highlighted.
 - (d) Set all checkboxes to Allow.
- Click **OK** to exit the dialog and return to the **National Instruments Variable Engine Properties**dialog.
- 17. Click **OK** to exit the **National Instruments Variable Engine Properties** dialog and return to the **Component Services** window. It will be selected to **DCOM Config**.
- 18. Windows Vista User's Only:
 - (a) Right-click Opcenum.exe
 - (b) In the resulting pop-up dialog, click **Properties**. The **OpcEnum Properties** dialog box will appear.
 - (c) In the **OpcEnum Properties** dialog, select the **Security** tab.
 - (d) In the Launch and Activation Permissions panel, select Customize.
 - (e) Select **Edit**. The **Launch Permission** dialog will appear.
 - (f) In the Group or users names list, select Administrators.

- (g) Ensure that the Remote Launch and Remote Activation checkboxes are not checked.
- (h) Click **OK** to close the **Launch Permission** dialog.
- (i) Click **OK** to return to the **Component Services** window.
- (j) Close the **Component Services** window.

19. Navigate from the **Windows Desktop** as follows:

Start >> Settings >> Control Panel >> Administrative Tools >> Services

20. Perform the following:

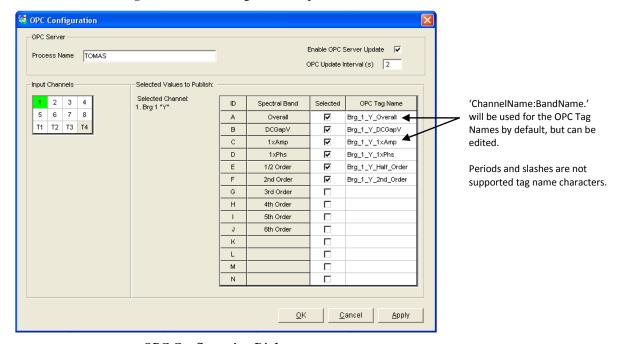
- (a) Select the National Instruments Variable Engine.
- (b) Click Stop the service and wait for the service to end (this typically takes about one second).
- (c) Right-click on the National Instruments Variable Engine.
- (d) From the pop-up menu, select **Properties**.
- (e) In the National Instruments Variable Engine Properties dialog box, select the Log On tab.
- (f) Select the **Local System account** radio button.
- (g) Check the checkbox that states, Allow service to interact with desktop.
- (h) Click the **OK** button.
- (i) Start the National Instruments Variable Engine service by clicking Start the service.
- (j) Close the **Services** window.

Using OPC

Accessing the OPC Configuration Dialog

To access the **OPC Configuration** dialog:

- 1. Run eZ-TOMAS
- 2. From the eZ-TOMAS main window, open the **Edit** pull-down menu.
- 3. Select **OPC Configuration**. The dialog box will open.



OPC Configuration Dialog

Understanding the OPC Interface

Process Name



The **Process Name** defaults to "TOMAS" and appears in the Process Name field of the **OPC Configuration** dialog. The Process Name will appear as a root name in the OPC hierarchy as seen by a browser.

OPC Configuration



The **OPC Configuration** dialog allows you to set an OPC Update Interval. The update interval works as follows: during acquisition, whenever the specified time has elapsed, gauge values are updated on the server. The interval is the closest multiple of the block time (<u>Acquisition Time</u>) as set in the *Acquisition* tab of the Setup Configuration dialog).



Reducing the OPC Update Interval (s) can degrade the performance of eZ-TOMAS depending on the CPU and memory of the host computer, especially when a large number of gauge data is being published.

Enable OPC Server Update



The **OPC Configuration** dialog also allows you to enable and disable the updating of values to the OPC server via an **Enable OPC Server Update** checkbox. When unchecked (disabled) the tags still appear on the server, but they will not be updated during a data acquisition. This control is identical to the checkbox on the **Status and Control** dialog (discussed later in this chapter).

Note that all items on the **OPC Configuration** dialog can be viewed, but not changed, during an acquisition. This means that while an acquisition is running, enabling (and disabling) must be performed from the control dialog.

Each channel can have its own band definitions with the exception of bands A through D. In addition, some channel types are restricted with respect to how many bands are supported. For example, tach, static and temperature channels only provide *Overall*.

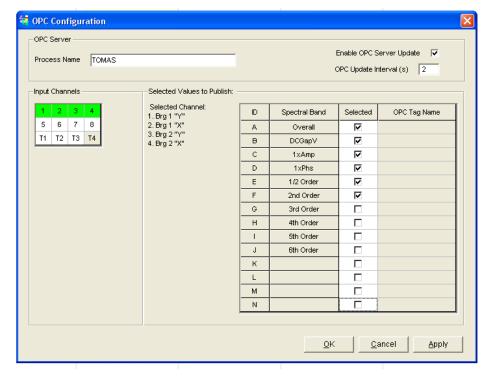
You can shift-select multiple channels to quickly select multiple bands (across the selected channels). In the case of the 'Selected' column, the background of the cell will be gray if different values for different channels exist. In this case, the visible value is that of the first selected channel. A white background indicates that the values for all the channels are the same.

OPC Tag Name		
Brg_1_Y_Overall		
Brg_1_Y_DCGapV		
Brg_1_Y_1×Amp		
Brg_1_Y_1xPhs		

Upon selection the **OPC Tag Name** field is automatically filled (if empty) with *ChannelName:BandName*. Note that periods and slashes are not supported; and spaces and quotation marks are converted to underscore. If the tag name field is not empty, then it will not be modified by selection. The OPC Tag Name field includes *tooltip help* which allows full tag name to be seen. OPC Tag Names can be viewed for individual channels only. The field will be grayed-out when multiple channels are selected.



Multiple Channels (1-4) Selected



Values to be Published, Six Spectral Bands for Four Selected Channels

Note: The maximum string length for the *Process Name* and *OPC Tag Name* is 128 characters, each.

The bottom right of the **OPC Configuration** dialog includes three buttons: **OK**, **Cancel**, and **Apply**. Their purposes are as follows:

OK Clicking **OK** accomplishes the following:

- Performs validation for duplicate OPC Tag Names, syntax, and failure to enable any gauge values for publishing.¹
- Closes the **OPC Configuration** dialog.

Cancel Closes **OPC Configuration** dialog without updating it.

Apply Identical in functionality to the **OK** button, except that **Apply** does not close the **OPC Configuration** dialog.

When the OPC configuration is changed, ensure that the OPC Clients are refreshed. This is important because a new *OPC Publishing process* is created for every configuration change. The *OPC Publishing process* will remain in existence until the next configuration change, eZ-TOMAS is shut down, a different project is opened, or a new project is initialized. The behavior of an OPC client in the event of a process no longer existing is client specific.

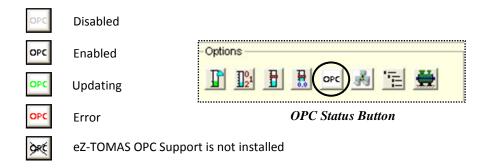


If OPC is configured, the OPC settings are not automatically updated when changes are made to the channel type or spectral bands. To ensure that OPC settings remain valid bring up the OPC configuration dialog and click OK after verifying the settings.

¹ An *OPC Publishing process* will not be created for any configuration that is invalid. Attempting to enable an invalid configuration will result in an error message.

OPC Status on the eZ-TOMAS and eZ-TOMAS Remote Main Windows

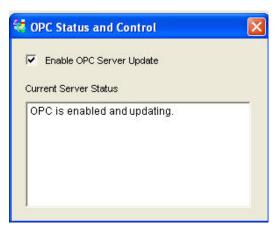
OPC status is indicated in the Options Area on the lower-right of both the eZ-TOMAS and the eZ-TOMAS Remote main windows. Icons are used to indicate the current OPC state.



Clicking on the OPC Status button brings up an **OPC Status and Control** dialog which gives detailed status. In addition, from eZ-TOMAS the dialog box allows you to enable/disable the OPC server update during acquisition. If server update is disabled during acquisition, then gauge values, as published, will be set to zero.

The Control pull-down menu also provides a means of displaying the OPC Status and Control dialog.





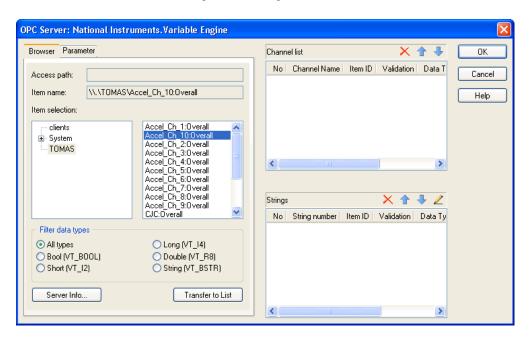
OPC Status and Control Dialog

The **OPC Status and Control** dialog provides the ability to control *server update* and provides an indication of the current server status. If an OPC process has been published, then *enable* will allow server update to take place during the acquisition. Note that you can check (or uncheck) *Enable OPC Server Update* while an acquisition is in progress, without impacting the acquisition.

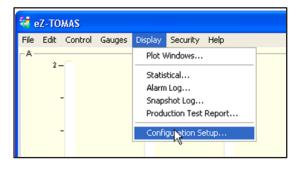
Subscribing to OPC Tags using third party applications

The user interface for accessing OPC tags published by eZ-TOMAS is client dependent, and requires specifying the following:

- The computer name on which the eZ-TOMAS project is running.
- The name of the OPC server (National Instruments. Variable Engine).
- The OPC process name, as specified in the *Process Name* field of the OPC Configuration dialog in eZ-TOMAS.
- The names of the individual tags, as specified in the *OPC Tag Name* column on the OPC Configuration dialog in eZ-TOMAS.



To obtain a summary of OPC information, which includes OPC Server name, process name, and tag names, go to: **Display** (pull-down menu) >> **Configuration Setup** and view the produced report.



Accessing 'Configuration Setup' to Obtain an OPC Summary

SPECTRAL BAND 1	SPECTRAL BAND to OPC Setup				
Process Name:	TOMAS				
Process Update:	2 Sec				
Server Update:	Enabled				
Band N		Tag Name	Path		
Enabled Gauge	Values				
Channel 1 - Tach Ch 1					
A.	Overall	Tach_Ch1:Overall	psp:\\localhost\TOMAS\Tach_Ch1:Overall		
Channel 2 - Accel Ch 2					
A.	Overall	Accel_Ch_2:Overall	psp:\\localhost\TOMAS\Accel_Ch_2:Overall		
В.	DCGapV	Accel_Ch_2:DCGapV	psp:\\localhost\TOMAS\Accel_Ch_2:DCGapV		
C.	1xAmp	Accel_Ch_2:1xAmp	psp:\\localhost\TOMAS\Accel_Ch_2:1xAmp		
D.	1xPhs	Accel_Ch_2:1xPhs	psp:\\localhost\TOMAS\Accel_Ch_2:1xPhs		
E.	SBand E	Accel_Ch_2:SBand_E	psp:\\localhost\TOMAS\Accel_Ch_2:SBand_E		
F.	SBand F	Accel_Ch_2:SBand_F	psp:\\localhost\TOMAS\Accel_Ch_2:SBand_F		
G.	SBand G	Accel_Ch_2:SBand_G	psp:\\localhost\TOMAS\Accel_Ch_2:SBand_G		
H.	SBand H	Accel_Ch_2:SBand_H	psp:\\localhost\TOMAS\Accel_Ch_2:SBand_H		
I.	SBand I	Accel_Ch_2:SBand_I	psp:\\localhost\TOMAS\Accel_Ch_2:SBand_l		
J.	SBand J	Accel_Ch_2:SBand_J	psp:\\localhost\TOMAS\Accel_Ch_2:SBand_J		
K.	SBand K	Accel_Ch_2:SBand_K	psp:\\localhost\TOMAS\Accel_Ch_2:SBand_K		
L.	SBand L	Accel_Ch_2:SBand_L	psp:\\localhost\TOMAS\Accel_Ch_2:SBand_L		
M.	SBand M	Accel_Ch_2:SBand_M	psp:\\localhost\TOMAS\Accel_Ch_2:SBand_M		
N.	SBand N	Accel_Ch_2:SBand_N	psp:\\localhost\TOMAS\Accel_Ch_2:SBand_N		
Channel 3 - Accel Ch 3					
A.	Overall	Accel_Ch_3:Overall	psp:\\localhost\TOMAS\Accel_Ch_3:Overall		
В.	DCGapV	Accel_Ch_3:DCGapV	psp:\\localhost\TOMAS\Accel_Ch_3:DCGapV		
C.	1xAmp	Accel_Ch_3:1xAmp	psp:\\localhost\TOMAS\Accel_Ch_3:1xAmp		
D.	1xPhs	Accel_Ch_3:1xPhs	psp:\\localhost\TOMAS\Accel_Ch_3:1xPhs		
E.	SBand E	Accel_Ch_3:SBand_E	psp:\\localhost\TOMAS\Accel_Ch_3:SBand_E		
F.	SBand F	Accel_Ch_3:SBand_F	psp:\\localhost\TOMAS\Accel_Ch_3:SBand_F		
G.	SBand G	Accel_Ch_3:SBand_G	psp:\\localhost\TOMAS\Accel_Ch_3:SBand_G		
H.	SBand H	Accel_Ch_3:SBand_H	psp:\\localhost\TOMAS\Accel_Ch_3:SBand_H		
I.	SBand I	Accel_Ch_3:SBand_I	psp:\\localhost\TOMAS\Accel_Ch_3:SBand_I		
J.	SBand J	Accel_Ch_3:SBand_J	psp:\\localhost\TOMAS\Accel_Ch_3:SBand_J		
K.	SBand K	Accel_Ch_3:SBand_K	psp:\\localhost\TOMAS\Accel_Ch_3:SBand_K		
L.	SBand L	Accel_Ch_3:SBand_L	psp:\\localhost\TOMAS\Accel_Ch_3:SBand_L		
M.	SBand M	Accel_Ch_3:SBand_M	psp:\\localhost\TOMAS\Accel_Ch_3:SBand_M		
N.	SBand N	Accel_Ch_3:SBand_N	psp:\\localhost\TOMAS\Accel_Ch_3:SBand_N		

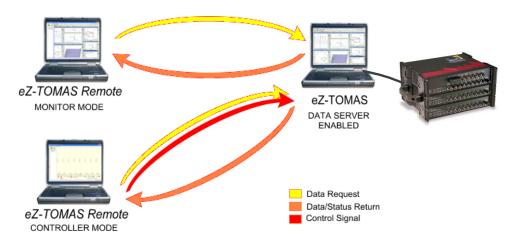
Example of an OPC Section of a Report (Partial)

10-12

```
What is eZ-TOMAS Remote?...... 11-1
Installing eZ-TOMAS Remote ...... 11-2
Running eZ-TOMAS Remote ...... 11-3
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Controller Mode ..... 11-5
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How to Read Status Lines...... 11-11
An Explanation of Offline Status ...... 11-12
Working with Previously Recorded Projects ...... 11-13
Troubleshooting...... 11-13
```

What is eZ-TOMAS Remote?

eZ-TOMAS Remote is a software application that allows you to remotely monitor and/or control eZ-TOMAS applications through client/server architecture. The server, an eZ-TOMAS application, interacts with the hardware; and can be in a remote location. Each client (*eZ-TOMAS Remote*) communicates with eZ-TOMAS via TCP/IP.

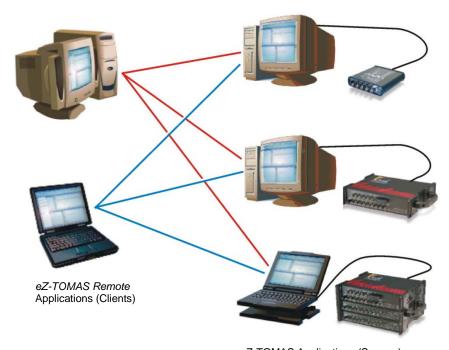


Two eZ-TOMAS Remotes Communicating with one Server (eZ-TOMAS) eZ-TOMAS Remote can be used to monitor and/or control multiple eZ-TOMAS applications.

Several clients can run simultaneously to monitor an eZ-TOMAS application. In addition to monitoring and controlling eZ-TOMAS applications, you can create unique plot setups that are local to *eZ-TOMAS Remote*. In other words, you can create custom display setups that exist only at the client.

As indicated in the following figure:

- Each eZ-TOMAS application can be monitored by multiple clients.
- Each client can monitor multiple eZ-TOMAS applications.



eZ-TOMAS Applications (Servers) connected to Dynamic Signal Analysis Hardware

Two eZ-TOMAS Remote Clients Monitoring Three eZ-TOMAS Servers

Installing eZ-TOMAS Remote

eZ-TOMAS Remote installations are entirely independent of eZ-TOMAS installations. However, the software version number of eZ-TOMAS Remote must match the version number of eZ-TOMAS (on the server PCs) for proper operation.

System Requirements

- 10/100BaseT Ethernet port
 [on PC or on a hub connected to the Ethernet]
- Monitor: SVGA, 1024 x 768 screen resolution
- Windows 2000 SP4 and Windows XP users:

PC with Intel[™] Pentium 1 GHz or equivalent; 512 MB memory 10 GB disk space

Windows Vista users:

PC must be Windows Vista Premium Ready

In addition to meeting the system requirements above, verify that you have the following:

- Dynamic Signal Analysis (DSA) CD
- License Key for eZ-TOMAS Remote
- User documentation: available in pdf format on CD and on-line at: www.iotech.com



eZ-TOMAS Remote and eZ-TOMAS version numbers must match in order for eZ-TOMAS Remote to operate.



An effective firewall will likely alert the eZ-TOMAS host application when eZ-TOMAS Remote is trying to monitor information or take control; and will block such remote attempts. We recommend that you maintain firewall protection; however, you will need to set your firewall to allow access to eZ-TOMAS Remote. As used here, providing firewall access means making ports used by clients and servers open [on both ends].

Software Installation

- 1. Start Windows.
- 2. Close all running applications.
- 3. Insert the Dynamic Signal Analysis CD into your CD-ROM drive and wait for the CD to auto-run.

If the CD does not start on its own:

- (a) click the desktop's <Start> button
- (b) choose the Run command
- (c) select the CD-ROM drive, then select the **setup.exe** file.
- (d) click <OK>.

An Opening Screen will appear.

- 4. Click the **ENTER SETUP** button.
- 5. From the hardware selection screen [which follows a licensing agreement], select the type of data acquisition device you are using from the drop-down list.
- 6. Continue to follow the on-screen instructions.



Reference Notes:

Adobe Acrobat PDF versions of documents pertaining to hardware and software are automatically installed onto your PC's hard-drive as a part of product support at the time of software installation. The default location is the **Programs** group, which can be accessed via the *Windows Desktop Start Menu*.

Running eZ-TOMAS Remote

To run *eZ-TOMAS Remote*, double-click the associated icon or use your Windows desktop Start button to navigate to the program. This is located in the programs group by default.

The first time you start the application you will be prompted for your name, your company name, and a license number. The number will activate *eZ-TOMAS Remote* for every day operations. Note that the *eZ-TOMAS code* does not apply to *eZ-TOMAS Remote*, and will not activate it. You must use the license key specified for *eZ-TOMAS Remote*.

If you are loading your software from a CD, the license key will be available on an Authorization Code Sheet that accompanied the CD as part of your order. If you downloaded your software from the website, your license key (authorization code) will be e-mailed to you within one business day.

The program's main window appears after your license key is accepted.

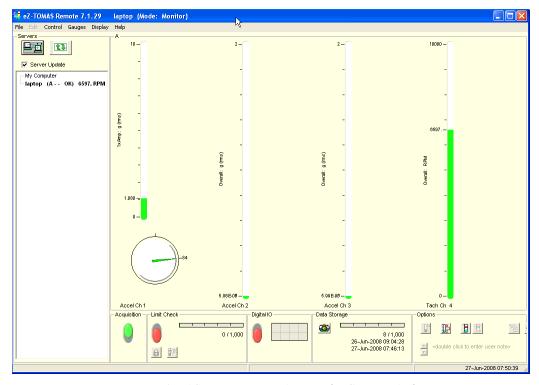
eZ-TOMAS Remote Operations

A single *eZ-TOMAS Remote* client can control multiple eZ-TOMAS servers. As indicated in the figure on page 11-1, when connected to a server, *eZ-TOMAS Remote* has two modes of operation:

- Monitor mode
- Controller mode¹

Monitor Mode

Monitor mode allows you to view data from an eZ-TOMAS application. You can view gauges and plots; and the data viewed can be live or historical.



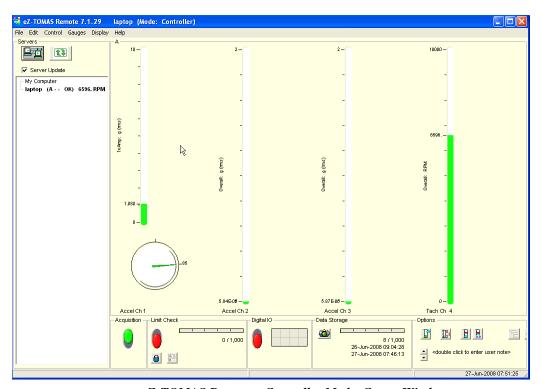
eZ-TOMAS Remote - Monitor Mode, Gauge Window

¹ The words *controller* and *control* in this context and that which follows pertains to control of the state and configuration of eZ-TOMAS, not to the control of the item being monitored.

Controller Mode

The controller mode allows you to control every aspect of the acquisition state for an eZ-TOMAS application. While in the controller mode you can:

- Configure an acquisition
- Set Limits
- Configure Digital I/O
- Start and stop acquisitions
- View gauges and plots



eZ-TOMAS Remote - Controller Mode, Gauge Window

A client may be enabled as a controller for a server if eZ-TOMAS is configured to permit such control, as discussed in the next section.



For each eZ-TOMAS application (server) there can only be one remote client configured in the controller mode.

Configuration

Server Configuration - Settings needed in eZ-TOMAS

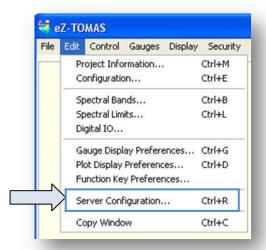


Before connecting a client (eZ-TOMAS Remote) to the server, the following must be performed via eZ-TOMAS:

- (a) initialize the project
- (b) verify hardware communication
- (c) configure the acquisition
- (d) set the input channels, and
- (e) configure the server

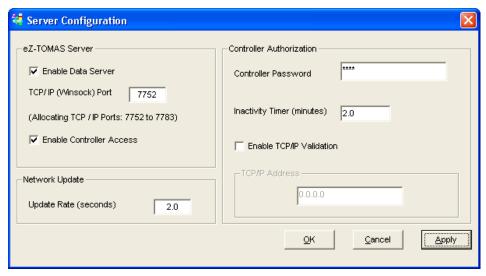
To configure the server:

- Open the eZ-TOMAS gauge window [main window].
- 2 Open the **Edit** pull-down menu (figure at right).
- 3 Select **Server Configuration**, as indicated in the figure. As an alternative you can use the shortcut, **Ctrl+R**.



Selecting "Server Configuration" from the eZ-TOMAS Edit Menu

A Server Configuration dialog box will appear (following figure).



Server Configuration (In eZ-TOMAS)

It is important to properly configure the server to meet your application's needs. Forgetting to enable the data server, for example, would result in no clients having access to the server. The following table describes the server configuration options and is broken down by panel.

Server Configuration Dialog Resides in eZ-TOMAS, access via Edit pull-down med				
eZ-TOMAS Server Panel				
Enable Data Server	Enables the data server when checked. Clients cannot connect to eZ-TOMAS when the data server is not enabled. The default value is "unchecked" (server not enabled).			
TCP/IP (Winsock) Port	The port number is used to establish communication between the client and the server. The server establishes and displays a range of port numbers that it listens to. Note that each remote that connects to a server must use a different port number for that server.			
Enable Controller Access	Allows an <i>eZ-TOMAS Remote</i> client to get control access (controller mode). Note that for each eZ-TOMAS application, at any given time, there can only be one client in the controller mode. If this box is not checked clients are limited to the monitor mode, assuming that the data server is enabled.			
Network Update Pan	el			
Update Rate (seconds)	Specifies how often the data sent over the server will be updated. The value must be at least 1 second, and no more than 60 seconds.			
Controller Authorizat	tion Panel			
Controller Password ¹	Sets the password that is required in order for a client to access controller mode. The password alone is not sufficient to access controller mode. In addition, the data server and controller access must both be enabled.			
Inactivity Timer (minutes)	Allows you to set an inactivity time for a logged-in controller. If no activity occurs within the set period of time, another client can take control without receiving a prompt. Activity in this case, is defined as making configuration changes.			
Enable TCP/IP Validation	This feature allows the host eZ-TOMAS to grant controller mode access to one specific client, as determined by its TCP/IP address.			
TCP/IP Address	When the Enable TCP/IP Validation checkbox is checked, the TCP/IP address in this field determines which client (only one) is permitted to have controller mode access.			

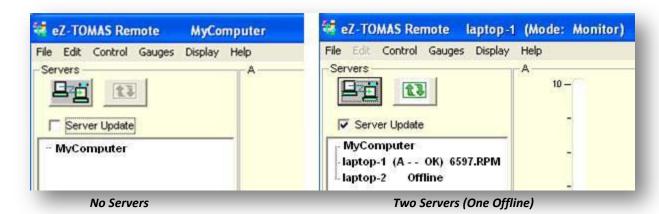
¹ The Monitor and Controller Modes of *eZ-TOMAS Remote* are entirely independent of User Level Security settings set in eZ-TOMAS. The *eZ-TOMAS Remote* controller password has no relation to the eZ-TOMAS security level password discussed in Chapter 9.



To avoid conflict between eZ-TOMAS and a client controller, uncheck the *Enable Controller Access* check box Prior to making any configuration changes via the Edit menu in eZ-TOMAS. In addition, avoid making any controller authorization changes while one or more remote logins are active.

Client Configuration - Settings needed in eZ-TOMAS Remote

A Servers Panel resides on the left side of the eZ-TOMAS Remote gauge window.



eZ-TOMAS Remote, Servers Panel

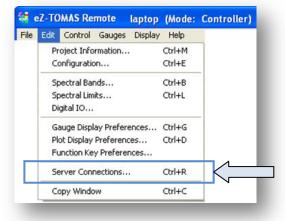
Servers Control Item		Function
	Server Configuration	Clicking this icon brings up the Server Configuration dialog box.
13	Server Refresh	Clicking this icon forces a refresh of the server status. This is used for first time connection of a server and for servers that go offline, for example, if port timeout was exceeded during communication.
		Note that increasing the Port Timeout increases the time it takes for refreshing the server list [when servers are truly not on line]. For example, if a server is 1) really offline, 2) is in the refresh list, and 3)Port Timeout is set to 30 seconds; then every time you click the <refresh> button the operation will take 30 seconds to time out [before completing the refresh operation. If you know the server is really offline, you can disable it to avoid the unwarranted slow refresh.</refresh>
~	Server Update	Checking the Server Update box enables automatic updates of server status. The update rate is defined on a per server basis in the Server Connections dialog box.

You can configure the Servers panel to have hosts via the Servers Connections dialog box.

To access the *Servers Connections* dialog box you can use the <Server Configuration> button that resides in the *Servers* panel [see preceding table]; or you

- 1. Display the *eZ-TOMAS Remote* main (gauge) window.
- 2. Open the **Edit** pull-down menu.
- Select Server Connections (see following figure).
 As an alternative to these steps you can use the shortcut, Ctrl+R.

After selecting *Server Connections*, its dialog box appears (following figure). The dialog allows you to enable servers, which can be specified by IP Address or hostname. You can specify an update rate for each server.



Selecting "Server Connections" from the eZ-TOMAS Remote Edit Menu

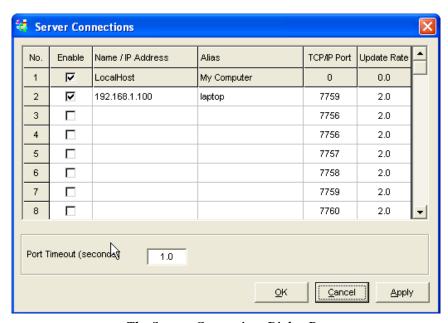
can:

If multiple clients will access a single server, each client requires a unique TCP/IP Port number. This means that coordinating the access of multiple clients to a single server must be done by port assignment. Ports are provided on a first come first serve basis.

If two clients happen to specify the same port, then the second client will get an offline indication from the server. There is no indication as to whether the offline condition is caused by an inactive or non-existent server, or by a server whose port is already in use. Up to 32 ports can be used.



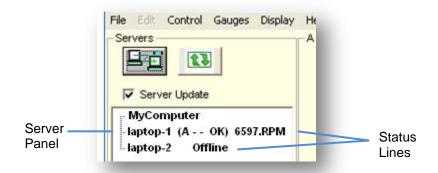
Be aware that an effective firewall will likely alert the eZ-TOMAS host application when eZ-TOMAS Remote is trying to monitor information or take control; and will block such remote attempts. We recommend that you maintain firewall protection; however, you will need to set your firewall to allow access to eZ-TOMAS Remote. As used here, providing firewall access means making ports used by clients and servers open [on both ends].



The Servers Connections Dialog Box

Servers Connections Dialog Box, Column and Field Descriptions Resides in eZ-TOMAS Remote, access via Edit pull-down menu			
No.	A pre-set value from 1 to 32. The column provides a numerical list of the host machine and serve		
Enabled	A checkbox is used to enable (checked) or disable (unchecked) a server. If already connected, unchecking the box doesnot remove the client from the <i>Remote Network Connections</i> dialog in the eZ-TOMAS server until after the client is restarted. Unchecking the box does remove the eZ-TOMAS server from the <i>eZ-TOMAS Remote</i> servers tree and from the refresh list.		
Name/ IP Address	Identifies the local host (eZ-TOMAS Remote host PC; which is always item number 1) and server IP addresses.		
Alias	An opptional user-friendly name for the server. For item 1, the local host, the alias of "My Computer" is used and cannot be changed.		
TCP/IP	Identifies the port that is being used for a servers's <i>Transmission Control Protocol</i> (TCP) and the <i>Internet Protocol</i> (IP). Each server must use a unique port. Note that the local machine, not being a server, has no TCP/IP port assigned.		
Update Rate	Rate The amount of time (in seconds) that will elapse before the status is updated.		
Port Timeout (seconds)	The amount of time that must elapse before a port is is designated as "Offline" in eZ-TOMAS Remote. The timeout value must be no less than 1 second and no more than 60 seconds. For more information pertaining to Port Timeout and its relationship with Offline status, refer to the section, An Explanation of Offline Status.		

Each configured server is listed on *eZ-TOMAS Remote*'s Server Panel [on the left side of the Gauge Window]. Each server name is followed by a status line. The following figure provides two examples of status lines. How to read staus lines is discussed in the subsequent section.



An Example of the "Servers Panel" in eZ-TOMAS Remote with 2 Servers Enabled

Clicking on a server in the server panel (previous figure) brings up a password prompt. This prompt allows you to request controller mode by checking 'Login as Controller' or for the monitor mode, by leaving the the checkbox unchecked.



To complete the request for controller mode you must enter the correct eZ-TOMAS 'controller password,' which was specified on the server (eZ-TOMAS application).

No pasword is required for monitor mode.

How to Read Status Lines

Each status line shows the overall status of a server (an eZ-TOMAS application). Note that these lines are updated regardless of whether or not the remote is logged onto the server.



Designator Position	Designator	Indication for the associated server
First	Α	"A" indicates that a live acquisition is currently in progress.
	-	"-" indicates that no live acquisition is in progress
	Offline	The term "Offline" refers to both (1) the associated server, and (2) the server connection. When a server shows a status of Offline the server may, in fact, be available; but a network connection [to the server] may not be. "Offline" will be the sole entry in the status line, when the Port Timeout value is met. The port timeout value is set [in seconds] in eZ-TOMAS Remote's Servers Connections dialog box. For more information refer to the section, An Explanation of Offline Status, which immediately follows this table.
Second	L	"L" indicates that limit checking is enabled.
	-	"-" indicates limit checking is not enabled.
Third	D	"D" indicates the Digital I/O state is enabled.
	-	"-" indicates the Digital I/O state is not enabled.
Fourth*	ОК	"OK" indicates no alarm limits have been reached.
	LOLO	"LOLO" indicates that a channel value dropped below the LO-LO limit value.
	LO	"LO" indicates that a channel value dropped below the LO limit value, but not below the LO-LO limit value.
	ні	"HI" indicates that a channel value rose above the HI limit value, but did not exceed the HI-HI value.
	ніні	"HI-HI" indicates that a channel value rose above the HI-HI limit value.
Fifth	RPM	If a tachometer is specified "on" for the configuration, then the RPM is shown as long as the RPM value is other than zero.

^{*} The fourth status designator consists of 2 or 4 letters; and indicates the operational status in relation to alarm limits.

The status is associated with the highest severity [of any limit and channel]. The limit values are set in the Edit menu.

An Explanation of Offline Status

The term "Offline" refers to both (1) the associated server, and (2) the server connection. When a server shows a status of Offline the server may, in fact, be available while the network connection [to the server] may not be.

eZ-TOMAS Remote uses a polling technique to obtain status and data. Each network request is protected by a port timeout, for which the value is set in the Server Connections dialog box [in eZ-TOMAS Remote]. If a request is not answered within the specified timeout interval, the connection will show a status of Offline.



An excessive occurrence of Offline states, while a server is known to be available, is a strong indication that the Port Timeout should be set to a higher value.

Setting a higher Port Timeout value will typically reduce the number of Offline occurrences. The following factors should be considered when resetting the Port Timeout.

Server Response Time

Other than the basic parameters of processor-speed and memory, eZ-TOMAS server response may be affected by the number of concurrent clients and/or the types of display transactions taking place.

- The monitoring of gauge data is a relatively light demand on a server; however, a large number of clients (*eZ-TOMAS Remote* applications) connected to one server may affect server response time.
- A request for time or spectrum displays of real-time or historical data places a much larger network demand on the server. Both time and spectrum displays result in time data for the number of specified channels being transferred from server to remote.

Note: The parameter which affects the amount of data transferred [for a given time frame or spectrum] is the *spectral lines* acquisition configuration parameter on the server (host eZ-TOMAS application).

Network Considerations

There is a distinct difference in network response times when considering the following two scenarios:

- Both the *eZ-TOMAS Remote* (client) and its host eZ-TOMAS application (server) reside on the same intranet.
- The client and server are running across a VPN connection or across the open internet.

To avoid excessive Offline occurrences, the Port Timeout setting will have to be set higher for the VPN and internet scenarios, as compared to when the client and server are on the same intranet.

Working with Previously Recorded Projects

If you want to use *eZ-TOMAS Remote* to look at historical data from a previously recorded project, simply open the project with the application. No server communication is required.

However, note that you cannot use *eZ-TOMAS Remote* to look directly at archived data which resides on the PC that is host to eZ-TOMAS. By *archived data* we mean data that has been saved, but that is not associated with the project currently opened.

To view data from a previously recorded project, via *eZ-TOMAS Remote*, you need to do one of the following:

- (a) Copy the eZ-TOMAS project to the file system of the eZ-TOMAS Remote, or
- (b) Make the eZ-TOMAS project 'network accessible' to the eZ-TOMAS Remote's file system.

Troubleshooting

	Symptom	Comment
1	Error messages received during historical data access	Errors may occur during historical data access if the rate at which storage is occurring is faster than network access time, and the FIFO has wrapped around. The error condition may be resolved by either (a) stopping acquisition temporarily (if acceptable), or (b) decreasing the rate of storage. For related information refer to the Storage Tab section on page 3-12.
2	Client can't connect to server	 In eZ-TOMAS, verify that the Enable Data Server check-box is checked (see page 11-7); if not, check it. If the client still cannot connect to the on-line server, go to the Server Connection dialog box in eZ-TOMAS Remote (see page 11-9). Look at the 'Name/IP Address' field for the associated server. If the field shows the server's host name, replace it with the server's IP address.
3	Server goes 'Offline' during operation	If a server or server connection goes Offline during operation, the client will not continue attempts at reconnecting. You can use the manual refresh button to attempt to restore the connection.
		Note that an excessive occurrence of Offline states, while a server is known to be available, is a strong indication that the Port Timeout should be set to a higher value. Refer to An Explanation of Offline Status , page 11-12, for related information.

	Symptom	Comment
4	Slow retrieval of historical data from the server	The amount of time required to retrieve data from a server is dependent upon several factors: • speed and memory of the host computer • network response time • the amount of data being transferred Certain remote operations involve acquiring large amounts of data. Such operations include viewing history data, alarm logs, and statistical reports. To reduce the delay associated with retrieving historical data, decrease the FIFO size on the server [see History FIFO, page 3-12].